Australian Personal Computer

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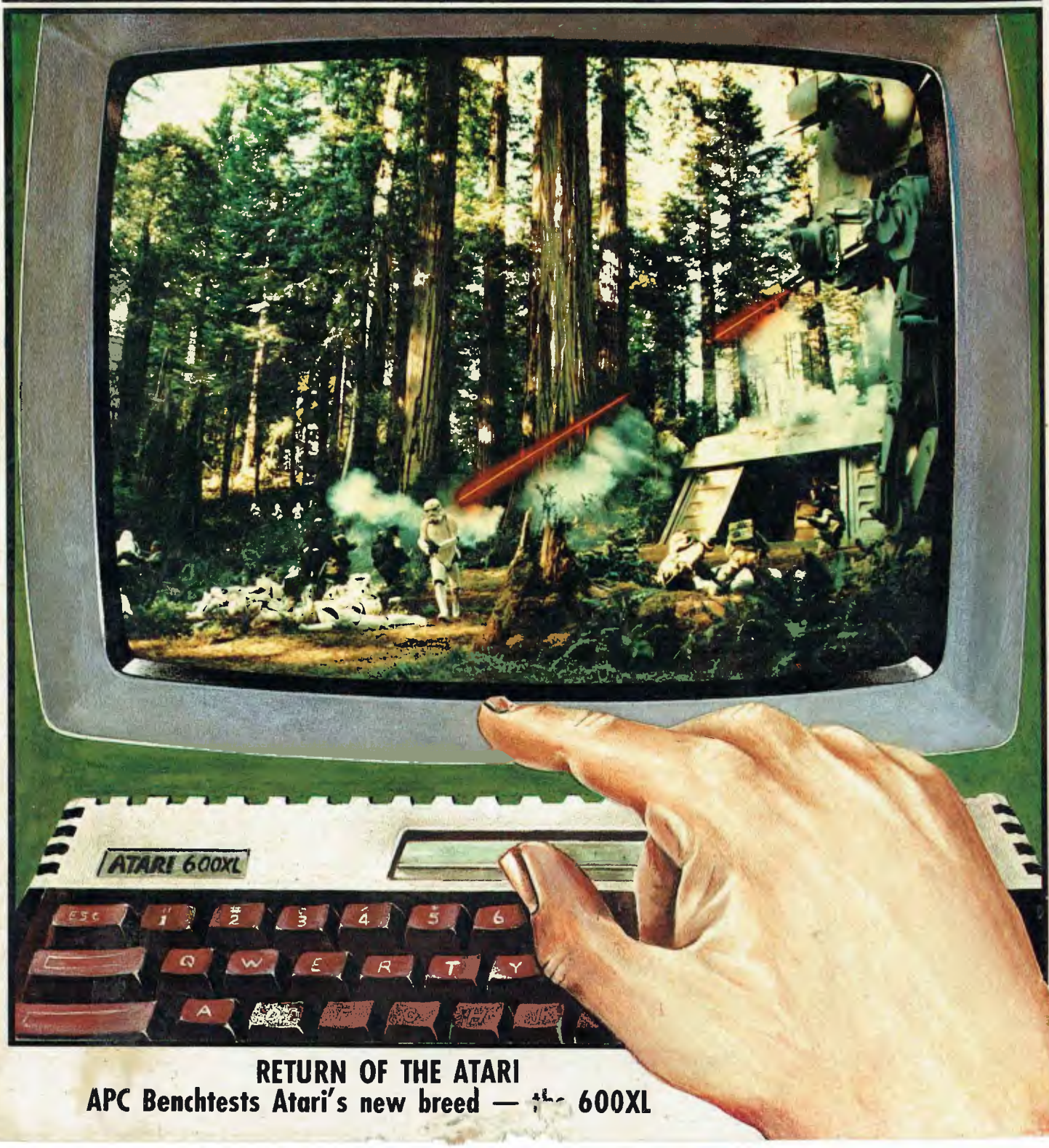
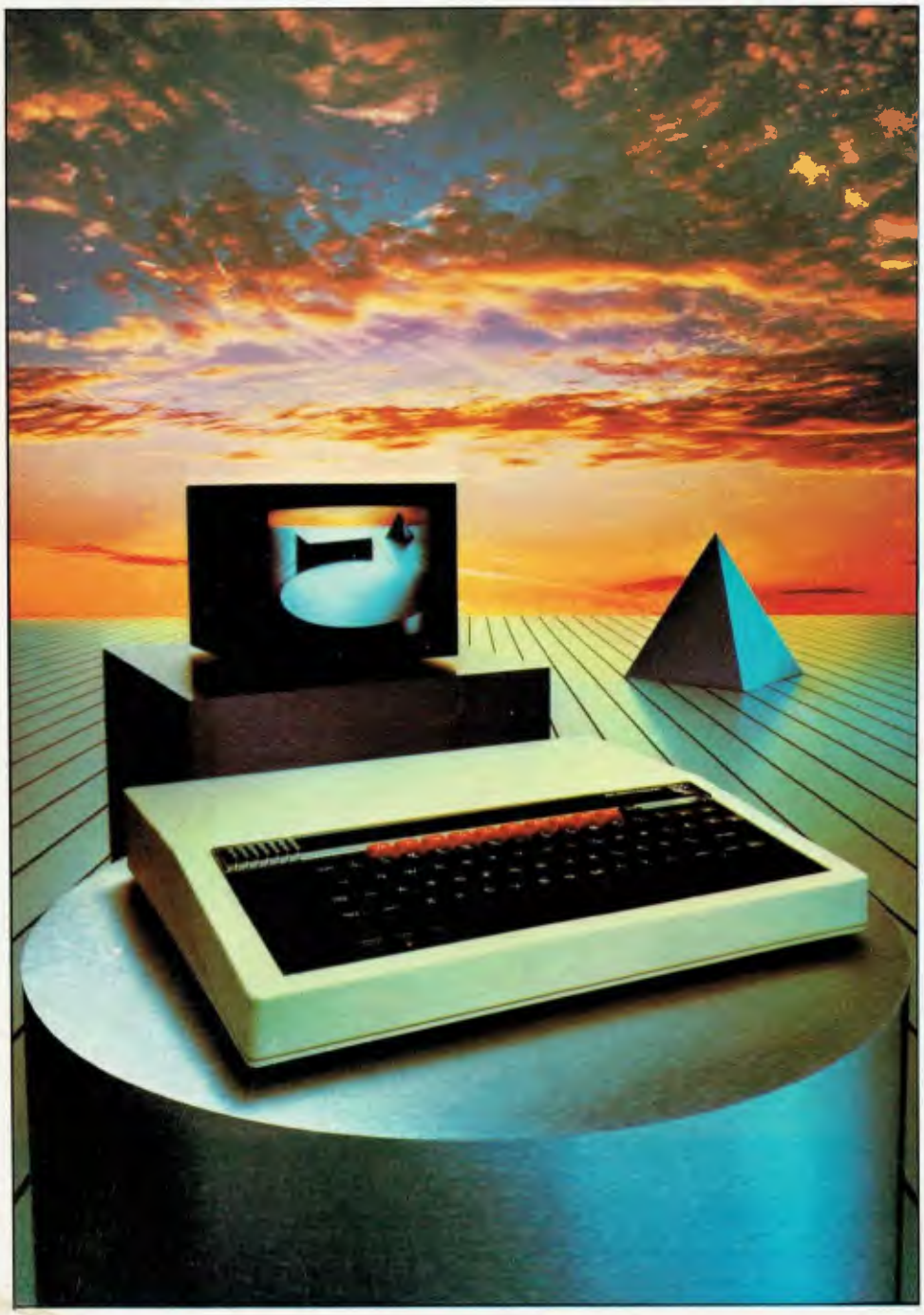
AUSTRALIA'S TOP SELLING COMPUTER MAGAZINE



RETURN OF THE ATARI

APC Benchtests Atari's new breed — the 600XL

BBC Microcomputer
The teaching computer for those who have done their homework



The BBC Microcomputer is the mainstay of the British educational system and will take their youth confidently into the 21st century.

The success of the BBC Computer Literacy Project is spreading rapidly across the world.

In Australia, a very large number of BBC school computer systems have already been installed in every state.

Why? Because 'The BBC' is not just an educational computer. It is one part of the British Government's project to produce the best microcomputer for education, plus the whole range of software and training aids needed to secure for youth the advantages of computer literacy in the coming computer age. Software abounds. The TV 'Computer Programme' has only begun. There is a wide variety of books and teacher aids. And the list grows constantly.

Australia is fortunate to be able to adopt the entire project without change — and to enjoy all the future developments. For the BBC Computer Literacy Project is ongoing. It will still be with us in the 21st century.

Of course, you are probably aware that Barson Computers were selected to distribute the BBC micro in Australia and New Zealand because they have the desired technical expertise, and are capable of giving BBC Microcomputer users a very high level of support indeed.

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☐ Educational Software
☐ Games Software

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As a result, more quality educational software has been developed for the BBC Micro that for any other educational computer. Not for the BBC the 'structured reinforcement' (drill and practise) variety of software. Here are examples of subjects, for students of all ages, covered by the world's most exciting educational and recreational software library.

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Fun With Words. Doctor Who. Fun Games. Philosopher's Quest. Monsters. Sphinx. Superlife. Adventure. Games of Strategy. Pirates. Snapper. Planetoid. Katakombs. Rocket Raid. Meteors. Super Invaders. Arcadians. Arcade Action. Games of Logic. Sliding Block Puzzle. Missing Signs. Cube Master. Chess. Time. Sailing Ships/navigation. Campaign 1346. Disraeli 1875. Castle of Riddles. Starship command. Missile Base. Snooker. Draughts. Reversi. Superlife. Battle. Cards. Hangman. Banner. Distances. Flags. Statpak. Countdown to Doom.

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Respondez. Comprenez.

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Spatial Perception
Shape Builders. Shape Shooter. What Shape. Axes of Symmetry. Crash. Perspective.

Word Processing
VIEW. Wordwise. Wordpack.

Note: The above describes existing cassette or disk software by title or content, and is a partial list only. Additional teaching aids including books, audio and video cassettes, tutors and OHP's, are all part of the BBC Computer Literacy Project. Software by Australian and International publishers and developers: Acornsoft, Advisory Unit, Cambridge Educational Software, Edward Arnold, Golem Software, Heineman, Input, Longman, Micro Primer, Passionfruit Software, Tas & WA Education Departments.

BBC MICROCOMPUTER / **BARSON** computers

Melbourne • Sydney • Auckland

inside

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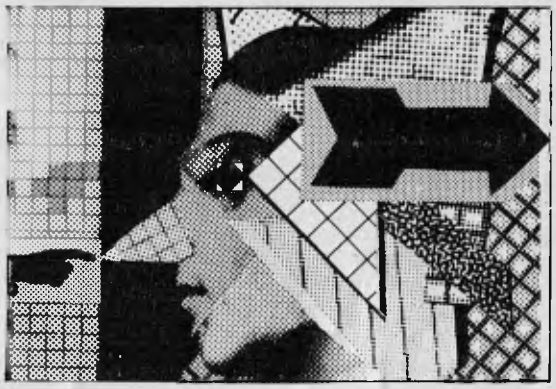

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007 and the computers

With computers recording births and tracking the whereabouts of graves in cemetries, they have both ends of life covered and are making inroads into the middle bits as well.

They were even intimately involved, both as spectators and participants in the series of events, or perhaps accidents, that lead up to the deaths of 269 people.

The sequence of events began with the departure of the Korean Airlines plane from Alaska. There is some doubt about what was the cause of the delay, some people feel that it was engineered by external and malign forces while others feel that the delay was the result of problems in the navigation systems and/or their computers.

Whatever the cause, once the aircraft was in flight, three things appeared to happen in fairly rapid succession. First the main navigation system and its back-up computers failed, then the two back-up systems failed one after the other.

This resulted in flight 007 varying its flight path to take it over Russian territory. So apparently three inertial navigation systems and their associated computers all failed simultaneously, and at the same time the flight crew failed to notice a truly massive deviation from course. Or had the flight instruments also all failed?

But is this series of failures reasonable? Probably not, therefore a safer assumption is that the systems and their computers were operating correctly; but somehow were given inaccurate data to work on.

One recalls that the same sort of error in loading data into a flight navigation inertia systems computer resulted in an Air New Zealand antartic flight crashing into Mt Erebus.

This problem of any of the three computers and a compass failing simultaneously, or the direct and intentional alteration of inertial navigation system data, raises yet another question.

If the data fed into the inertial navigation system computers were wrong, was it deliberate or was it the action of some nasty group, intent for its own purposes, on having KAL 007 fly over Russian territory for as long as one and a half hours or roughly the distance from Sydney to Adelaide and more?

One has to ask then, what would be the gain in sending a civilian airliner over those Russian naval bases and through that vast amount of prohibited flying space? Well one has to point out that the Korean government and the Airline had little or nothing to gain from the action. But the big winners, whether the incursion be intentional or accidental, were the Americans.

If we can stretch our minds to accept that data loaded into the KAL plane's inertial navigation system computers at Anchorage in Alaska was in fact correct, then we have to assume that three separate computer based systems failed simultaneously, that they developed software or hardware bugs at the same time. This scenario is possible, if not likely, and if so the end result has been a series of tragic misunderstandings, and harsh but understandable judgements from a military point of view, all of which brought on the deaths of hundreds of people.

But even if the deaths and the incursions were just the result of a series of errors and computer failures, to stretch credibility to breaking point, it is still true that the US benefited vastly and has scored both an intelligence coup that is priceless and has caused an economic disaster to the Russians.

As the KAL plane flew over the Russian bases the ground radars would at first have not been switched on. But after an hour or so they would have all been in action revealing to US radar pickets their exact locations. The various airbases would have been forced, after a time, to scramble their fighters, and military ground radio traffic would be massively increased, again making an intelligence bonanza. Even data transmission channels would be overloaded. As a result of this increased activity in the electronic spectrum there is now stored in some US military computer or computers, the locations of most of the Russian defence radars on the Khamchatka Penisula and Sakkalin Island, and also the identity of most of the ground military units, the response times of the various airforce units, and the performance to combat altitudes of the various local fighter units.

All this wonderful stuff is now available to US military planners because three computer systems on a 747 all failed at once. The compass on the flight deck seems to have failed at the same time.

So from a US military point of view those 260 odd people can hardly have been said to have died in vain. You see now the Russians have now to change all the military locations they have built up for the last few decades and this will cost them a vast amount, several thousands of millions of dollars at least.

There is a lesson for the computer community in this whole affair; we must recall that ultimately we aren't dealing with machines with a certain mean time between failures, but with people like us who often get only the one failure each.

By the way, the rockets that the LA 15 pilot used to shoot down 007 were each guided by an on-board micro and would have been fired by another computer on the fighter plane launching them. You see humans aren't fast enough to fire weapons in the 1600 kph fighters.

I wonder will we ever find out who loaded the on-board inertial navigation data?

Frank Linton — Simpkins

Cover up

I absolutely dare computer bookshops to stock the latest computer book (on the Forth language) from Elcomp Publishing. Its cover is the reason they won't.

On the front is a distinctly Priapic male holding the word 'FORTH' (carved out of stone) above his head, much to the admiration of another individual — an equally heroic female figure concerning whom the Roman poet Catullus would have said 'O vos papulae horridulae!' without a forth thought.

I mention this only because I'm staggering under a bombardment of publicity from Elcomp (of Pomona in California, not some kibbutz in Israel), and can't work out which bit to mention, so the choice fell on the irrelevant. Sorry.

The company has announced stuff for Sinclair, Atari and Commodore 64 — books, expander boards,

Dollar for Dollar, Byte for Byte, at $1995* the Archives P.C. is without doubt the best Microcomputer value for money in Australasia

The Archives P.C. has a clear 80 column display format. A television interface is provided. The 40 column mode displays bold characters for easy vision on most TV sets. The optional 80 column monitor provides high quality display for office or home use.

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software, important sub-routines and tutorials.

Apparently there are 20 software products and eleven books, so it really would be silly to try to print the whole list here.

Guy Kewney

$150 micro

A Danish designed, Hong Kong built home micro has been released in Australia by Computerplay. The basic specifications are: sound, Z80A cpu, 2k RAM expandable to 32k, 8k ROM and a black and white TV interface.

The distributors claim a big plus in that it is software compatible with Basic Sinclair programs and a machine code translator is also in the pipeline. A colour pack is on its way which will sell for around $70, upgrading the unit to full colour status.

Details are available from Computerplay on (03) 561 1078.

Flat out

If ever there were a market research project which missed the point, it must be Stanford Resources' report on flat information displays.

A flat display can be built in eight different ways, none of which is a standard TV tube (cathode ray), and each of these ways is more expensive 'in cost per character displayed' than the CRT or video display we all know.

So what?

We've been using a Tandy 100 computer for the past two months. It displays only 320 characters, whereas our main computer can display 2,400.

The fact that the desk-top machine has a cheaper cost per character but is more bulky, is not the reason we use Tandy. We use the Tandy because its display uses so little power that it can run for hours off a four pen-cell battery. So it can be used in the bus. Or in the pub.

Sure, if you produced a Tandy with twice the size of display and a finer detail, we'd buy that instead. In fact, when Tandy does launch its 16-bit lap-held machine this time next year, with 80 column by 20 line display (oops, was that meant to be a secret?) and a 16-bit processor, we'll be clamouring to have one.

Flat display? Probably it will be flat, but what's that got to do with it? What's the power consumption? That's what matters.

And for $2275, you can buy a report on Plasma, LCD Vacuum fluorescent, thin-film electroluminescent, flat CRT, Electrophoretic Imaging, Electrochromic, and 'other' display techniques which, so far as we can find out, does not touch on the question of power consumption.

Windscreen

Imagine if someone were to instal 2000 terminals in Sydney to provide free public access to the Seven Text system or Prestel or whatever the thing's name is called.

The purpose of these terminals being simply to provide a visitor's guide to Sydney. A wonderful idea you might say. But if you did say that then someone would swiftly tell you that it wasn't possible because of some wretched law or regulation.

There is also the certainty that within hours of installation all the terminals would have been destroyed as some sort of weird cultural protest, like burning antique trains and the kicking over of garbage tins by rural visitors to my suburb.

In more civilised, if colder parts of the world, terminals have long been in use to provide free public access to information without either protest or damage. Perhaps it may be just that other races have better co-ordination and higher manual dexterity than Australians, who can't even seem to drink beer on commercials without dribbling.

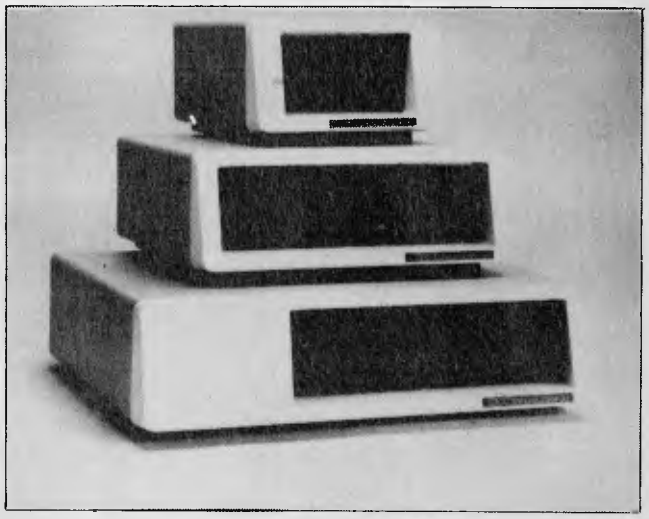
Many West German cities have terminals at rail stations that provide information about train times, platforms and at least time routes, and now the city of Toronto, the one in Ontario, (not the one on our powerhouse coolant Lake Dolt), has moved to instal 2000 terminals to link in with Canada's version of Prestel called Telidon. Frankly I prefer the Telidon system and the Canadian habit of having all the paragraphs in the same colour rather than the rainbow hues of the systems I've seen here.

The province of Ontario decided to instal these terminals in Toronto (one hopes that they are cold resistant as the city is colder than you would believe. Even Santa Claus puts on an extra cardie when he visits and you know what he's used to. There is also the local children's song, "Blitzen the Bluenosed Reindeer.")

The terminals were installed by mid 1982 and located in places like hotel lobbies, tourist attractions, shopping malls and provincial and federal government tourist centres.

It is planned to have 50,000 pages of information available to the terminal users and initially it was estimated that about half the visitors to Toronto were reached. By the way if you go there, don't feed the squirrels in the parks, the animals approve but the police don't, and you might get a ticket. Feeding squirrels out of season is punishable by a term of not less than 50 years in Newfoundland or more than 100 years elsewhere.

Frank Linton — Simpkins



The box at the bottom of the pyramid shown here may look like an IBM Personal Computer, but it isn't — it's two hard disk drives and space for five extra IBM circuit boards.

It's the idea of American firm CMC International. It's called Targa II, and prices start, for the five megabyte single drive on the top of the pyramid, at $1500.

No, it isn't the cheapest on the market. But the expansion chassis is quite a nice idea.

CMC headquarters are in Bellevue, Washington (near Microsoft) on (206) 885 1600.

Atari's Action

Atari is set to launch a new language, called Action, for its home computer range.

And according to Chris Horseman, Vice President of advanced games development, Action will combine the best features of a number of languages.

"It is almost as fast as assembler, and has features from Basic, Pascal and C," Horseman told us. "It will be released as a cartridge, but is not ready yet."

Horseman, who is now in the newly-formed Atari Entertainment Division since the company merged with computer and video game operations, uses Action himself for game prototyping and expects that it will be used as a fast games programming language for home users.

Video mania

As anyone knows who has inadvertently switched on a game on his terminal, electronics games are markedly addictive. Parents who at first welcome the peace and quiet of games hooked children later on begin to move through alarm, to panic on the way to a terror similar to finding a syringe and white powder in the bathroom.

In the US, from whence all good computer things come, one hears of a nice boy called Eric McGill who fell into a close and loving relationship with an electronic games arcade near his home. His parents were not aware of his condition, the parents are often the last people to know.

In their ignorance they moved from the proximity of the arcade to the gentle US countryside away from Eric's arcade. Eric didn't think well of this move as he had already dropped out of school to play the machines.

In order to turn his parent's attention away from the country Eric torched the family residence. Still unable to grasp the magnitude of the problem, Eric's parents and his probation officer couldn't at first get any information out of Eric.

He wasn't talking at all. In fact his condition was rather close to a form of Autism. But then video games addicts often exhibit such symptoms as we all have seen.

The condition was new to the parents and the probation officer but after an accidental mention of electronic games Eric began to tell all to the listeners.

Once the floodgates were opened the whole sordid story of electronic mainlining tumbled out. After the matter came to court Eric was given probation under certain conditions.

Eric has to enroll in an adult learning centre and get a job to pay off some of the damages to the house. In addition Eric has to stay away from electronic games arcades for ten years. It is also rumoured that he has been ordered to shun any contact with IBM PCs or Tandy portables until the governor's pleasure be known.

Frank Linton — Simpkins

Statistical routine library

Micro Stat Software has released a mathematical and statistical library of subroutines for machines running CP/M 2.0+. The seventy four routines are intended for any discipline which requires matrix manipulation including evaluating the inverse, determinate, Eigenvalues and various forms of decompositions on matrices.

There are also routines related to the evaluation of distributions such as the Normal, Chi^2, Students' T, Hypergesmetric and F distributions.

All the subroutines can be called by a user written Fortran 80 or Basic 80 compiled program and are linked to that program by both the CALL statement and Link 80.

U^{2}SL is an Australian product and available from Micro Stat Software.

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- **Meteor Multiplication** — Multiplication
- **Demolition Division** — Division
- **Alligator Mix** — Addition and Subtraction
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Arcademic Skill Builders in Math meets the needs of individual students by providing the following game control options:

- The program range of numbers can be changed to practise basic drill with the numbers 0-3, 0-6, or 0-9.
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DLM programs have been extensively field-tested. DLM is committed to quality. DLM programs have been highly praised time and time again in reviews in countless journals. *A child never outgrows DLM software!*

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Another set of educational games from DLM is Arcademic Skill Builders in Language Arts. Each of these six new software packages provides a highly motivational approach to learning in vital language arts areas:

- WordMan — word building through patterns
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- Word Radar — sight word recognition
- Word Master — antonyms, synonyms and homonyms
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Normally, the 'two' uses DOS 3.3, and the 'three' uses SOS (sophisticated operating system, officially, but actually meant to rhyme, in America, with 'sauce') and there is no way to pass information from one to the other.

Officially, Prodos is designed 'to provide increased compatibility between the two environments' and provides 'the higher performance required for more sophisticated Apple II applications'.

Unofficially, dealers tell me, it should be read as a straw in the wind that will blow the Apple III away.

They may be mistaken, but for my money the Apple III was never a good idea, and what people really wanted at the time was an expanded Apple II. The II, in its new form (the IIe), can be expanded all right: it just needs the software innovations of the III, and it's good for another two years.

So it's got them. All it needs on top of that is the ability to read and write Lisa diskettes, and it'll be good for three years. Bet you they do it inside twelve months.

Guy Kewney

Politics is the art of the impossible

Only a few days after his preselection as Liberal Party candidate for the Sydney seat of Waverley, Datec head, Harry Douglas, was under the political gunsight of the NSW Premier.

Long wedded to the computer industry, Harry's move into infidelity, under the prompting of the seductive wiles of the Liberals, had its first consequences when the Premier named Harry as the adviser of the Deputy Leader of the NSW Liberal Opposition, better known as Her Majesty's loyal NSW Opposition, Ms Rosemary Foot. Harry was also noted as being a giver of "bizarre" parties according to the Premier.

Now the idea of Ms Foot playing Trilby to Harry Douglass' Svengali may just possibly have some basis in fact, but "Bizarre" parties, that's just too much to accept without a fight. I mean I've seen a baboon steal someone's hotdog, heard of a man having his ankle chewed by a tiny lion cub, and have witnessed one of the computer industry's most successful employment consultants wearing a rattlesnake rattle on a cowboy hat at Harry's parties, but "Bizarre", never.

Frank Linton – Simpkins

Sirius portable

A portable version of the Sirius 1 is on its way from Victor in the States. But although the portable will be entirely software and disk compatible with the basic single-sided Sirius, it will have significant internal differences.

The most major of these is the choice of processor. Rather than using the 8088, a 'sawn-off' 16-bit processor with an 8-bit data bus, as used in the Sirius 1, IBM PC and many other machines, it will be based on the 8086. This has a full 16-bit data bus and requires its memory to be organised in 16-bit words rather than the 8-bit byte-wide organisation used by the 8088. The Sirius portable will also come with 256 kbytes of RAM as standard, rather than the 128k provided in the basic Sirius.

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PRINTOUT

Said to be 'about the size of a small sewing machine', the portable will have a 9-inch screen. With hard disk versions of the Sirius taking an increasingly larger slice of the market, the introduction of the portable could well herald the phasing out of the single-sided Sirius to allow Victor to sell a range of software-compatible machines featuring the portable at the bottom, the Apricot for the smaller user, and the double-sided and hard disk Sirius models at the top, where they will eventually be joined by the Sirius 2, widely thought to be based on the much more powerful Intel 186 or 286 chips.

Peter Rodwell

OKI on line

It was New Year's eve of the year 5744 when my lent OKI IF 800 Model 20 was delivered and the office was in a state of pre-festival euphoria.

Being a thing of beauty and a joy forever I wasn't in the same panic to get home by 5.42 pm as others among my colleagues, and also the Sigma people who were exchanging "Shaloms" with everyone.

That being as it may, I was left as the gentile on the spot with only a manual to enable me to work the OKI into a state of eager readiness.

If things were worrying on the Wednesday night they got rather worse on Thursday. Sigma was off to a man blowing its own shofar and the only man in the place who had ever used "Wordstar" was unavailable, due to an appointment he had had for nearly 6000 years.

To make matters worse I had decided that I'd take on the OKI while playing the role of unskilled executive, the total civilian who is absolutely defeated by the task of resetting his digital travelling alarm clock.

This role means, according to more than a few colleagues, that I have been typecast again. But who cares about them? I am secure in the knowledge that I am last non-IBM male who knows what the runes "RAMAC" mean.

One question still remains, was it harder to get the printers, of which we have two on the console and a Qume, to work, or to get the meaning of the instructions for the game "Alien"?

Despite the desperate odds, I managed to set up a few stories and send them to my editor in the south. He and the production people were delighted by the better quality copy.

As an interim report on using the OKI some assets show up and some liabilities. Oddly the liabilities are not ones that I would have expected and largely have little to do with the system operation.

Firstly let us look at the superficial bad news. The main problem with using the OKI is simply that the CPU and integral printer/screen take up rather a lot of space on a standard office desk. Frankly if you use an OKI then you need a larger desk

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than standard.

One other liability that wasn't expected was a problem with the power supply. It was easy to accidentally have one's power switched off, and an easily identified power cord colour would be preferable.

On the asset side, so far along in our use of the machine we are just scratching the surface of the possibilities, the OKI screen is outstanding. With direct light from a large window falling onto the screen the operator hasn't any real difficulty in reading the characters.

It is curious that the screen was fulsomely praised by everyone who used it, save only one staff member who had difficulty in reading characters and some symbols. But one in about 40 seems rather better than average.

On the output side it is hard to fault the machine and the performance of its Qume printer is as good as one expects from a Qume, that is excellent.

From the point where it was delivered, unpacked, plugged in and then switched on, the machine has run without any electronic or mechanical problems.

I really wish that I could love "Wordstar". I am aware that it has tens of thousands of delighted users and that possibly I am too inexperienced to enjoy it properly, but it is not to my taste. More later in the user period.

F.Linton-Simpkins

IBM's new baby

News is filtering through about IBM's new baby home computer known variously as the Peanut, Hercules, Sprite, Pigeon or Pancake.

IBM is carefully avoiding showing anyone the complete article— software developers see software specs and hardware suppliers see hardware ones. But it looks like an 8-bit 8080 based machine, the no-frills model coming in at about $700 for a CPU/keyboard unit including 64k RAM and one 320k disk. A complete system including monitor will cost about $1300 (in the US).

IBM is apparently frustrated at the delay in launching the machine which was intended for September but is now expected this month. Even so the company hopes to sell 90,000 units before Christmas and 350,000 in 1984.

Memory will be expandable to 128k RAM and there is talk of a strong emphasis on communications and software compatibility with the IBM PC.

The machine will be distributed through the giant retail stores chain, Sears, and possibly through Computerland and K-Mart too.

Meanwhile IBM has increased its equity share in chip maker Intel from 12% to 14%.

Jane Bird

The breaking of Osborne

Despite all logic, sense and gossip, the move to rescue Osborne is on, with a great many firms involved.

People who tell you that "there is no future in trying to keep Osborne going, because there are no assets", are everywhere since the company called in bankruptcy proceedings last month.

They could have missed the point, however.

There is the obvious unarguable fact that a buyer for Osborne will be taking on huge responsibilities.

And the sort of visible assets which a buyer would like to see — sellable stock, exciting new technology, satisfied dealer network — don't appear to exist. And the liabilities, according to "informed sources" — people with axes to grind, usually — are: a huge inventory of unprofitable Osborne I machines, enormous debts to software houses like Digital Research, MicroPro, Sorcim, Microsoft and others.

What is happening, however, is that a great many of these (and other) suppliers have got together, and agreed that they have to protect their own future by ensuring that Osborne can eventually pay its bills.

"We are planning to restructure our accounts receivable position with Osborne", was the way one senior executive from Silicon Valley put it last week, when asked to discuss it 'off the record' with us.

And the predictions being made now range from the sensible to the wildly extreme: "the entire management team will go to jail," is one report received, while "The company will be back in manufacture within two months," is also being said — and both options are silly.

What is known about the company is that it was caught with large inventory

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DEALER ENQUIRIES WELCOME

of a very unprofitable machine — the Osborne 1 — at a time when two of the biggest retailers were waging a price war.

It also failed to launch a new model, the Executive, when competition from Kaypro was undermining the old model, and competition from Compaq was creaming off the big corporate orders.

"The street price of an Osborne 1 went down to $1,300, because Sears and Xerox both thought they were about to find themselves stuck with obsolete stock," summarised a Sorcim executive last week. "Then they started competing with each other."

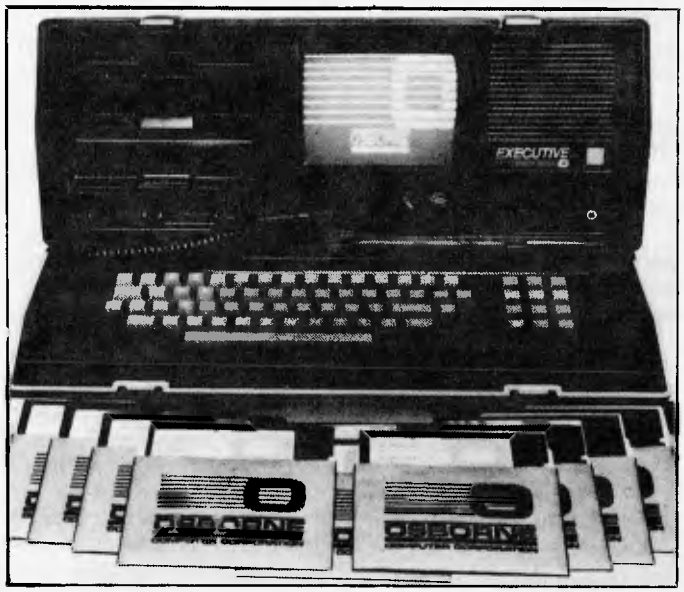
Most small dealers just couldn't buy at that price, let alone sell profitably, and they were forced to unload their stocks — and confidence in the future of the Osborne 1 evaporated.

But our research illustrates clearly that nobody will ever know the full story about the fall of Osborne. There are just too many people with livelihoods on the line, people with old vendettas, and even people with the threat of prison sentences hanging over them.

Two months ago, when Osborne abandoned its attempt to get public share quotation and went for private finance instead, the embarrassing turnround was explained as "due to the double-density problems".

The "double-density" problem was simple: when the machine was upgraded from its 100k diskette capacity, many machines didn't work.

The decision was made at the highest level to withhold double-density machines until the problem was sorted out, and (said sources) the cash flow was all one way, out. Nobody wanted a single density machine — even today, ex-dealers are trying to arrange fires in just that corner of the warehouse — and nobody could have double density.



Osborne's Executive model

Even then, that explanation wasn't satisfactory. Osborne himself has been totally incommunicado for the past few weeks, but he is known to have expressed irritation at the double density story.

The "too much software" story arises from within the software houses who sold it: two large programming houses insist that orders for unsellable but expensive programs were placed with reckless abandon. Twenty thousand copies of a language called PL/M, of value only to systems programmers who don't use Osbornes as their development systems, would indeed be a strange purchase, and our information says firmly that such an order was placed.

Osborne's own theory, according to friends is that the man he hired to replace his as President, (Jaunich) simply wasn't up to the job, and refused to face reality.

There are plenty of alternative theories, widely used as Silicon Valley currency.

Here is one version of the saga, from an insider in Hayward, California.

"This company just barely survived Adam Osborne's leadership up to the time when the board finally moved him out of the President's job. By then, it was too late.

There was no management structure, there was no profit plan, and the finance side was just a lot of dreams. And all the excited, dynamic people who started it up were quickly joined by a load of hangers-on, inadequate time-servers and simple free-loaders."

There is a description from a large creditor:

The company had very bad luck over the Harris deal, which looked as though it would make the old Osborne 1 profitable again. They were going to buy several thousand systems, and on the basis of that, the company decided not to kill the machine off, but to order parts to build another 15,000."

From another insider, no longer with the company:

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KILOPEDE & GHOST MUNCHER are two super arcade games that were originally to sell for $17.50 each but a typing error in our catalogue placed them together by mistake! We have decided to leave them together for what must be the best value in this catalogue.

KILOPEDE revolves around a nasty Centipede charging down through the garden towards you. When your beetle makes a direct hit, the Centipede breaks into two! Now you have double trouble. Watch out for the flees, bugs and most of all, the gardener's boot!

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TRSBEE is a package of three programs that loads TRS-80 Model 1 and 3 program tapes into the MicroBee without any additional hardware. Although some program editing will still be required prior to their running, the majority of program typing time is saved by TRSBEE. The first program loadsTRS-80 BASIC programs into MicroWorld BASIC. Most programs may then be edited and run. The second program in the package loads any TRS-80 machine code file into MicroBee memory. The third program loads TRS-80 assembler files into the MicroBee EDITOR/ASSEMBER. Any TRS-80 Model 1 or 3 tape may be loaded. TRSBEE opens up a whole new world of possible software on your MicroBee! **$30.00**

TAPE DOCTOR is an easy to use programming aid for loading and saving programmes on tape. TAPE DOCTOR will load nearly any program from tape, regardless of protection system. BAD LOAD files may be loaded also and TAPE DOCTOR will aid in finding the faulty byte. Saving files of any type become a breeze. Create Auto Start BASIC files and files that include both BASIC and machine code subroutines. Comes complete with a monitor. If you use tapes at all, TAPE DOCTOR is a must. **$17.50**

DEBUG is a utility program to enable the debugging of machine code programs as they are written on the MicroBee using EDASM. The program operates at the assembler level. Break points are inserted in the source code as calls to a subroutine. The source code, with included breakpoints, is then assembled and the resulting code is executed in the normal way. Program execution will halt at the first break point encountered with a display of the internal Z80 registers. With execution halted, registers can be examined and modified as can memory locations. Execution can then proceed until the next breakpoint is encountered. By means of breakpoints inserted in the source code, the programmer can examine all or any part of the operation of the program on a statement by statement basis. **$17.50**

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LOGO BEE is a graphics language. Specifically designed to introduce children to computer programming, LOGO BEE is destined to become a standard on the MicroBee. Both simple and intricate designs may easily be drawn on the screen in hi-res through use of short and easy to understand LOGO BEE programs.

LOGO BEE programs are based on an imaginary turtle moving about the screen leaving a trail behind him. The turtle may be moved in any direction for a given distance. He may then be turned any number of degrees and moved again. The trail may also be turned on or off. Each short routine is given a name, such as SQUARE, CIRCLE or TRIANGLE, depending on the shape created. These routines may be used within other routines. In this way, the concepts of programming can be easily introduced to young children and adults who have had no previous computer experience.

LOGO BEE was written specifically for MicroBee graphics. The program is essentially idiot proof and is a joy to use. **$22.50**

COMPOSER BEE II is an excellent aid in learning music theory Write your own melody on the screen staff and listen to the result. You may now transpose, add to or modify your tune. The notes on the staffs will change accordingly and you may again listen to the result. COMPOSER BEE II is graphics orientated, has a 2 octave range, handles accidentals, non-standard timing and repeated sections of music. Teachers and students alike will welcome COMPOSER BEE II. **$20.00**

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PROGRAMS

```
220  DATA "PROJECTILES.THE BA
T IS","CONTROLED USING THE KEYS"
230  DATA "FOR <=S AND K=>.PR
ESS","ANY KEY TO START THE ","PROJECTILES.GOOD LUCK"
240  FOR D=1 TO 1000
250  NEXT D
260  CALL CLEAR
270 CALL COLOR(2,2,15)
280  CALL COLOR(11,7,15)
290  CALL COLOR(12,5,15)
300  CALL COLOR(13,13,15)
310  CALL CHAR(112,"COCOCOCOCOCOCOCO")
320  CALL CHAR)113,"030303030 3030303")
330  CALL CHAR(114,"000000000 0FFFFFF")
340  CALL CHAR(115,"0000000000COCOCO")
350  CALL CHAR(116,"000000000 0030303")
360  CALL CHAR(120,"FEFEFEFEFEFEFE")
370  CALL CHAR(128,"FEFEFEFEFE")
380 MAN=5
390  SC=0
400  Z=0
410  BT=14
420  CALL SCREEN(15)
430  CALL HCHAR(1,9,114,15)
440  CALL HCHAR(1,8,116)
450  CALL HCHAR(1,24,115)
460  CALL VCHAR(2,8,113,22)
470  CALL VCHAR(2,24,112,22)
480  PS=8
490  A$="SCORE"
500  W=24
510  GOSUB 1750
520  GOSUB 1500
```

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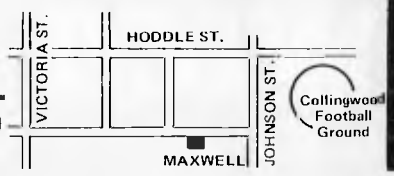

such a fanfare and it promised so much that it was bound to attract close interest. Perhaps it was naive to believe that for $600 (now $700) a system could offer the kind of features it does — full keyboard, high speed tape, daisywheel printer and more — without corners having been cut in its design. This is a harsh, and unforgiving business.

And demonstrating that it never rains but it pours, a Coleco shareholder has sued the company for misleading the public about the Adam.

It seeks damages for people who bought Coleco stock between the May launch of the Adam and the end of September.

DR homes in

Gary Kildall, the man who invented CP/M, is planning revolutionary changes in the way computers are used in the home.

Using technology already developed by the company he founded, Digital Research, he predicts that within two years home computers could provide a network of electronics links that will bring greater efficiency and greater security to life at home. And unless home computing develops in this functional way it'll run the risk of being little more than a game-playing fad for most of its users, said Mr Kildall.

'Home computer use is really based on games and standard utilities at the moment. But the way to move ahead is to have a computer system which controls functions in the home,' he said.

Strange days in Network Nation

From Chris Rowley in the USA

As readers of Printout will have gathered, the pace in Microland USA is pretty intense this year. No dead cat will be left unturned, in fact the official Computer-Hater's Handbook is counted as a likely best-seller this fall. Despite the rumour, it's not true the author was Adam Osborne.

However, Osborne's demise, coupled with the spectacular reverses suffered by other big names this summer, has put a chill on the micro media image. But market analysis shows micros still selling strongly, although to a savvy public that is getting pretty picky.

Top 10 models account for 88 per cent of sales. Despite IBM's heavy presence, the market is still open and there are at least 150 small outfits battling away on the edges. Such a market will punish any managerial errors. Question: Was A Osborne stampeded off a cliff by all those IBM-compatible portables that were announced with such fanfare last Christmas? His premature announcement of the IBM-compatible Osborne 'Executive 2' is now said to have been the fatal mistake. Osborne thought the business elite he confided in would keep the secret, but these aren't those kind of times. There are no secrets (except in IBM).

The winners continue to win. Apple is said to be doing 70,000 Apple IIes a month now. IBM is moving 35,000 PCs and 10,000 XTs. Commodore 64 is going great guns. Timex Sinclair is said to have shot itself in both feet with a long lag in getting RAM modules to market for the TS 1000. Commodore offered a $100 rebate on the 64, if you traded in any old computer. It reaped a rich harvest of $50 TS 1000s.

Meanwhile, the odds on Coleco's magnificent, go-for-broke gamble on the Adam got a bit longer. The FCC has yet to OK the EPROM that will drive the Adam's printer, there are fears of radio interference. No FCC licence, no sale, so Adam is delayed. Coleco's factory will be on double shifts for the rest of the year, but if Adam doesn't get into the Jungle of Eden called Christmas shopping, there'll be nothing but joy at Atari, which is winding up for a heavy fall campaign itself. But while tooth-and-claw remains the name of the game in the market place, out on the wide-ranging telenets, there is something more interesting in progress. 'Reach out and access someone' is the buzz phrase of the moment.

All over the land, computer users are plugging in modems and going out to chat on bulletin boards. At night the wires light up as 'Network Nation' comes out to play. The Compuserve net has about 70,000 subscribers now. The big competitor is The Source. Then there are smaller, more elite services like EIES, a study programme run by the New Jersey Institute of Technology in Newark, which has 1,200 members scattered about the nation.

Beyond that, there are hundreds of small user group bulletin boards. On CB Simulation, users chat via one-liners, everyone hiding behind a merry moniker of some kind. This is an elite, even elvish group and so things are rather polite for the most part. Invitations to war games are as frequent as invitations to Compusex, which is basically a form of written, erotic recreation.

Meanwhile, Timothy Leary, sometime LSD advocate, has become a micro enthusiast behind his IBM PC. Tim's new tune is 'turn on, tune in, LINK UP'. He sees Network Nation as fertile ground for raising support for space colonies in the Legrange points of the Earth/Moon system.

If the thought of Timothy Leary running a turned-on, micro-linked space habitat boggles the mind, consider the potential of an experiment Commodore is funding in California. One Virginia Brauer, nursery supervisor of a safari park, is teaching a chimp called Isaac to spell with the aid of a Commodore 64 and some special programs.

Isaac was first taught some Amesian signs and then when he showed interest in an Atari 800 at the safari park, Commodore grew interested and set up the experiment. If Isaac shows promise on his 64, maybe Ms Brauer will invest in the new, cut-rate Lisa and really turn him loose. Why, he might even want to plug into the Source, and join the rest of the Network Nation on the anonymous wires at night.

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Commodore 64

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Probably the best supported new-generation computer today, with several magazines dedicated solely to the 80 C, and lots and lots of software available, from us and also Tandy. Uses the 8/16 6809 CPU with up to 64K user memory, 32 x 16 screen as standard (up to 64 x 32 under software control) and can use standard cassette recorders and disk drives. Two levels of Basic language available.

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Redstone

This reasonably priced computer looks very similar to another very well known "fruit" computer and also appears to run all the ????-isle software. Check us for availability and prices, 48K as standard memory, or up to 256K as option.

Fox

A multi-processor computer that as standard, includes Fox DOS and Forth languages. Runs Apple software and can also run CPM; full range of expansion cards available.

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He has no intention of publishing specific plans and prefers to keep the competition guessing. But Digital Research has in recent weeks launched products and outlined plans that hint at an increasing concentration on the consumer software market. It made its name with a business operating system, but having changed one industry by developing a standard there seems no reason to suppose that it can't transform home electronics as well.

Forming the foundations of Mr Kildall's plans are the real-time operating system Concurrent CP/M, and the multi-functional, easy to use interface VIP (Visual Information Processor). VIP is Digital Research's answer to Apple's Lisa technique, enabling newcomers to microcomputing to use systems with ease.

Put these two together and you've the basis for a home control system, says Mr Kildall. The sort of system he has in mind would link home and office, and render obsolete switch and knob controls.

'The important thing is to make any computerised function better than the existing alternative. It should be better in terms of being simpler to use, more effective, cheaper and energy saving.'

This is what Digital Research will be studying in its electronic home showcase being built at its Californian headquarters.

Mr Kildall is confident Digital Research will lead the field. 'We have a clean slate; we have no baggage to carry. We don't have to worry about building hardware to test. We can get on with developing the software.'

Gary Kildall: 'The way to move ahead is to have a computer system which controls functions in the home'

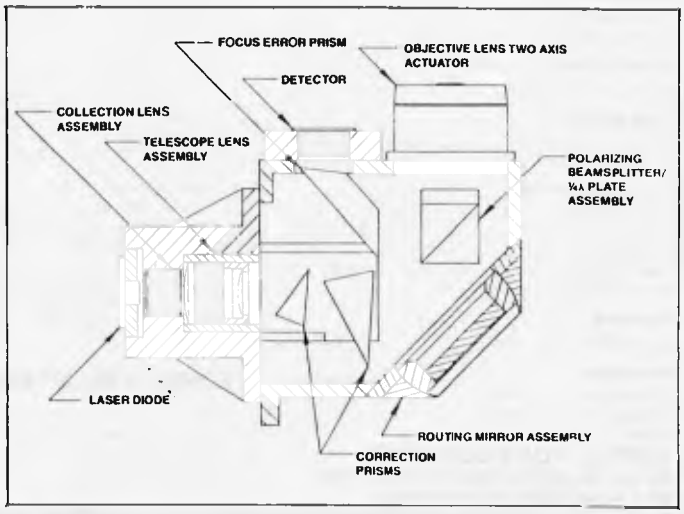
Laser bonanza

Next spring could see the first appearance of a storage device that brings the price per megabyte down to $7.

Shugart will unveil its optical disk drive, the Optimem 1000, at Comdex in Las Vegas in November. First shipments of the device, which is expected to sell for around $7,000, should begin in the first quarter of 1984.

The Optimem 1000 uses non-erasable laser technology to store 1 gigabyte on one side of a removable 12in disk. Developed by a Shugart subsidiary, it can be connected to any micro that corresponds with the ANSI standard Small Computers System Interface (SCSI); this was previously known as the Shugart Associates System Interface but on becoming a standard it had to drop the developer's name.

Shugart sees the drive being used where large amounts of data are stored but not regularly accessed.



The collective lens assembly is the nerve centre of Shugart's optical disk.

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GALAXIANS (32K) **$26.50 Disc**
Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, hi-score, rankings, bonus laser bases, increasing difficulty, superb graphics and sound.

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Incredible arcade type game featuring mushrooms, flies, snails, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the mushrooms increase.

FRUIT MACHINE (32K) **$26.50 Disc**
Probably the best fruit machine implementation on the markets. This program has it all . . .HOLD, NUDGE, GAMBLE, moving reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

ALIEN DROPOUT (32K) **$26.50 Disc**
Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joystick.

INVADERS (32K) **$26.50 Disc**
Superior version of the old classic arcade game including a few extras. 48 marching invaders drop bombs that erode your defences, and 2 types of spaceship fly over releasing large bombs that penetrate through your defences. Hi-score, increasing difficulty, superb sound effects and graphics.

SPACE FIGHTER (32K) **$26.50 Disc**
Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of menacing alien fire at you and may attempt to ram you. Separate attack phases, fuel dumps, asteroids, repeating laser cannon, smart bombs, hi-score, rankings, 6 skill levels, bonuses.

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PRICES INCLUDE PACKAGE & POSTAGE

The disk is removable but it is protected by a hard shell cartridge; double sided units will be available, and you'll be able to access the second billion characters by flipping the disk over.

An optical disk might be expected to operate at the speed of light but Shugart isn't yet confident enough to debunk all existing scientific theory: its device has an average access time of 100 milliseconds and a transfer rate of 5 megabits per second.

The drive occupies a space 7in by 19in by 24in. When it will occupy this sort of space on Australian users' desks is not yet certain, nor is the price.

Optical disk technology focuses a light beam through a protective plastic layer which serves as the disk substrate; the recording layer is deposited on the substrate and the light beam pierces the plastic to read the disk.

ACRA lashes out

The Australian Computer Retailers Association has had very few complaints about dealers ethical behaviour, showing, according to the ACRA, that one side of the ethical sword is pretty sharp.

However there has been a surprising response from fellow dealers complaining about unethical behaviour by some computer suppliers," says Bernhard Kirschner the President of the ACRA.

The following is a statement from Bernard Kirschner, the President of ACRA:

'The Computer Retailer is the contact point between customer and product. The retailer will spend many hours explaining and comparing various computers, advising on the software for the customers needs, only to find that some distributors will supply the customer direct, or encourage the customers in advertising to obtain some part of the system direct from the distributor, so eliminating the retailer. Some smaller suppliers blatantly tell customers to see the product at a computer store and then come and buy directly from themselves.

Elimination in more than one sense. The specialist retailer is essential in the market place to advise and support the customers, but the support we receive from suppliers is wanting. Unless suppliers value their retail distributors more highly, we will have to reduce that support to survive, and without specialist support the customer and distributor will both suffer.

"We do not appreciate some suppliers allowing the retailers to establish a product, then the supplier selling direct to our customrs.

"We do not appreciate some suppliers making special offers on parts of systems direct from themselves, such as printers.

"We do not appreciate suppliers presenting us with sudden massive price cuts, and we being given a limited period to unload our now overpriced stock on an unsuspecting public, at old higher prices. Besides the ethical problem, some dealers start discounting to the new price almost immediately, making the other dealers look overpriced, so the whole thing becomes a mess.

"We do not appreciate suppliers promoting a product, we supporting that product only to find that there is not stock for us

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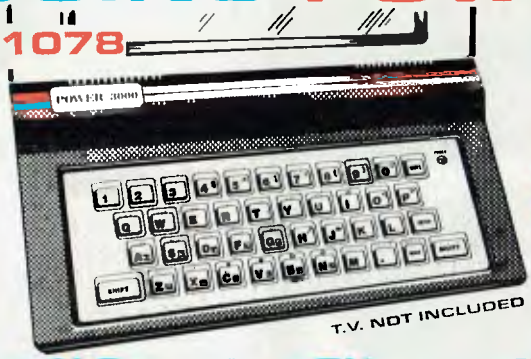

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Includes Power 3000 Computer, AC Adaptor, Cables for TV & cassette recorder & English Instruction Manual. All you need is your own cassette recorder & home TV & you're underway.

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POWER 3000 ● THE PEOPLES COMPUTER ● POWER TO THE PEOPLE

to sell, while a major retailer may have plenty stock.

ACRA is currently contacting suppliers to determine their policies on these matters.

Koala pad

With true Austen Tayshus enthusiasm, products from around the world are being imported into Australia and renamed with something more sympathetic to our culture vis: several micros — the Wombat and Koala and the rumoured adventure and action programs "Walkabout" and "Gumtree Gladiators".

The latest peripheral to be baptized is the Koala Pad from Ozisoft. It's a graphics tablet (suitable for the Commodore 64, VIC 20, Apple, IBM and Atari micros) which allows you to draw pictures directly onto your computer's monitor with features like copy, mirror, colour full, box, circle, zoom and so on. It is being sold through retail stores, but if you want more information phone Ozisoft in Sydney on 29 6330.

In the past 12 months Rabble Ozi Computers in conjunction with Comp Soft Manufacturing have designed and produced the Rabble 65. The 6502 based machine offers RS232, centronics interface Kansas City cassette interface, 50k static ram, full size keyboard with numeric key pad and function keys and high resolution graphics soon expandable to 1000 x 1000 pixels with 16 colours. Compsoft are also offering a software library for all users, part of their plan for greater user participation in the future development of software for the Rabble 65. An 8-bit subset of Unix is being developed as a standard operating system, while at the moment a Z80 CP/M card (with an extra 64k of RAM) is available. More information is available on (03) 429 9779.

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Dirty micros

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Danish Documentation Standard realises this, and have released a range of keyboard, disk (5¼ and 8"), screen and cassette cleaners. Once you have cleaned the screen, you could also take a look at its anti glare spray for your monitor. DDA are in Melbourne on 51 7603.

Buzzard Bait

Sirius Software Inc., has announced the release of Buzzard Bait, an action game for the Apple II and IBM PC.

Buzzard Bait pits the player against up to three pairs of "deadly" birds who prey on humans to feed their young. The player in his ship is on a rescue mission to save the people from their fate. The game can be played with either a joystick or a keyboard.

Buzzard Bait is available on disk for the Apple II and IIe and IBM PC personal computers. Suggested retail price is $58.95. It is distributed in Australia by Imagineering.
Phone: (02) 212 1411

Aussi Supermicro

Businesses frustrated with the standard but now somewhat dated CP/M operating system on 8-bit micros might take a look at an Australian micro from AED Computers. The Universe Supercomputer II runs an extension of CP/M called SuperAED which has as a major attribute multiple program

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Pictured bottom left.

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Ozi Soft Light Pen for VIC 20 and C 64
pictured bottom centre

The first Light Pen designed and built in Australia. And adds new dimensions to home computing, making interfacing with screen graphic simple and versatile. Plus many other capabilities you should explore. Complete with programme

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See other advertisements of the Amazing KoalaPad and Triga Command joystick also pictured.

NEW RELEASES FROM OZI SOFT

Underworld of Kyn C64

This great game programme has taken months to develop and Ozi Soft is proud to release it as one of the best computer adventures yet. This intelligent programme understands complete sentences and challenges you to destroy the evil powers of the Wizard of Kyn. Escape the twisted underworld of tunnels and rooms. Then avoid the perils that lie beyond. Really something for all adventure fans $24.95*

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IMAGOMAT 1051/1

selection capability. What this means is that if you've got your secretary typing away on your wordprocessing program and an urgent query comes in regarding the availability of a part from stock, you don't have to work your way out of the WP program back to PC/M, fire up the stock control program and make your enquiry. Multiple program selection (MPS) enables users to hit only three keys, wait about six seconds and find themselves in the appropriate program.

The SuperAED operating system is CP/M compatible so these additional features don't restrict the number of available applications programs - any CP/M package is claimed to work on the Supercomputer II.

Other features of this Australian designed and manufactured PC are dual processors (8 and 16 bit providing a wide range of operating systems including MP/M, I/OS, CP/M-86 and MS-DOS), keyboard substition (allowing applications packages to receive input from other programs as if they were the operator), multiple printer selection and automatic RAM testing to allert the operator to faulty memory locations.

The basic machine is comprised of an 8-bit 8085 cpu and 16-bit 8088 (switching between the processors is automatically performed by the system depending on the software loaded from disk), 64k of RAM, 80 x 24 display and up to four 8" disk drives (1.2 Mb per disk).

This is only the briefest of overviews. Contact AED on (02) 689 1744 for more information.

Grand Prix support

City Personal Computers, in conjunction with Apple Computers, is to sponsor two formula one cars in the Australian Grand Prix at Calder Raceway on November 13th.

One of the cars, driven by Sydney driver Brett Fisher, will be run in full Apple/City Personal Computers livery, while the other, driven by front running John Smith, will be part sponsored by Apple alone.

Announcing the deal in Sydney, City Personal Computers Managing Director Peter Hatcher said that it was a one-off arrangement to help the local drivers in Australia's premier Motor Racing Event.

Says Peter Hatcher, "With racing stars like Keke Rosberg, Alain Prost and Nelson Piquet entered, the local drivers will need all the support they can get. We are looking forward to a great race."

END

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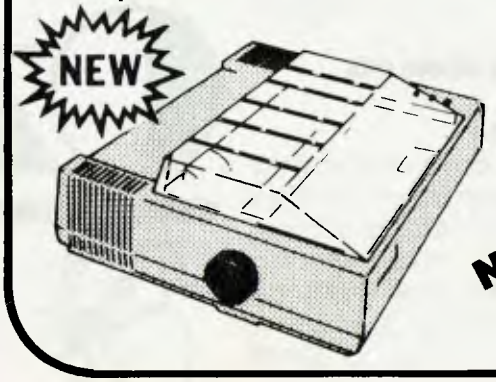

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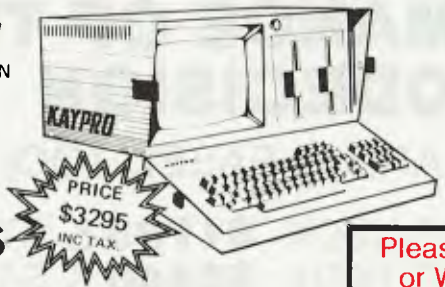

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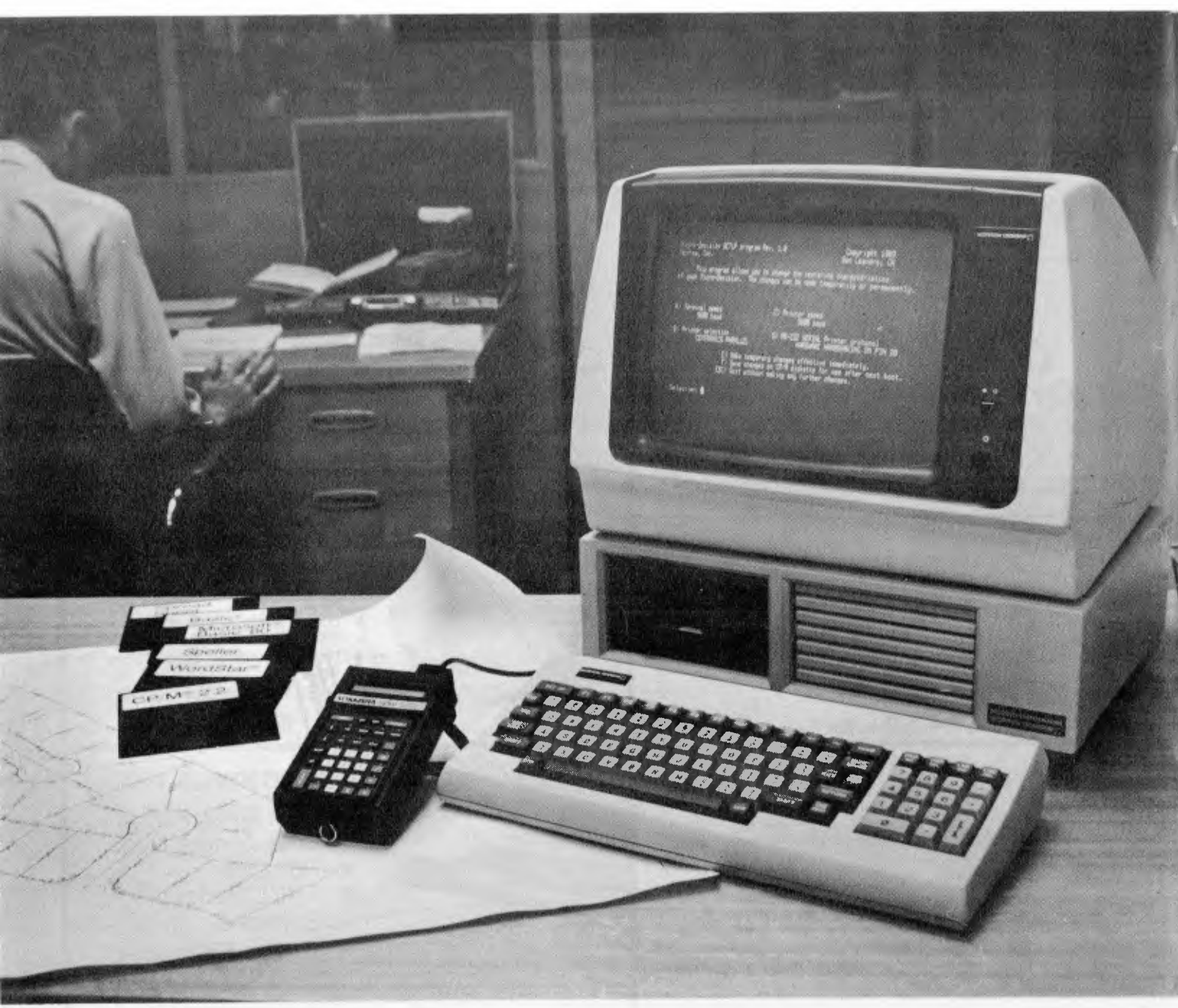

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BENCHTEST

ACT APRICOT

Barson Computers' latest launch, the Apricot, is something of an innovation. User-friendliness, transportability, Sirius-compatibility and excellent value for money are star qualities which ought to guarantee this 16-bit machine a leading role in the micro show. Peter Rodwell reports.

'Apricot' as a name actually started as an in-house project code name of the British micro company, ACT, rather than an attempt to exploit the popularity enjoyed by other machines with fruity names. It is in fact a very rough acronym for ACT's full name, APplIed COmputer Techniques — geddit?

As a result of ACT's close links with Victor, the Sirius manufacturer, the Apricot has been subjected to two important developments.

Firstly, it is software compatible with the Sirius, an important attribute as there is now a large amount of software available for the latter. This is a bold step at a time when almost everybody seems interested in making only IBM PC claim-alikes, and certainly must have caused a few surprises over in the US, where the industry seems to think of very little other than IBM compatibility.

Hardware

The Apricot comes in a stylish, beige, injection-moulded, three-box design and is, considering the power it packs, remarkably small. The main box, housing the CPU, RAM and disk drives, is 42cms wide, 10cms high and 32cms deep, approximately, and the keyboard is very slightly narrower, about 18cms deep and tapers from 5cm high at the back to 1cm at the front.

Sensibly, publicity for the Apricot refrains from describing it as a portable computer, preferring the term 'trans-portable', which sums it up quite neatly, for while the main box and keyboard together weigh only 8kg, the monitor is of course separate. Here it is unlike the supposedly portable — but much heavier — Osborne-type of machine which has the screen built in.

The transportability is aided by a neat arrangement for clipping the keyboard to the underside of the main box, with small pegs to hold its coiled cable. A flap pulls down to cover the disk drives and a toughened polycarbonate carrying handle pulls out from the box just under the front edge for easy carrying. This leaves you with one hand free to carry the monitor (which also has a carrying handle moulded into its casing).

I think the Apricot design is a good compromise; truly portable computers won't appear until a reasonably-priced flat screen appears and the current 'portables' are really far too heavy to live up to their description. Interestingly, the possibility of using a flat plasma display on the Apricot was investigated but was rejected when the supplier quoted a price of something like $6000 per display — in quantity!

At the back of the main box is a row of sockets: power (with a fuse holder and illuminated on/off switch nearby), monitor, serial port, parallel port and keyboard. Undoing three screws on the back panel opens up the entire case.

Inside, there's a main PCB — which can slide right out for easy servicing — under the power supply and disk drives. Everything is neat and tidy, so there shouldn't be any trouble passing any electrical safety standards with the Apricot.

The Sony microfloppy drives are beautiful pieces of engineering and are reputed to be very reliable. They are virtually silent, apart from a soft click as the computer turns them on and accesses them. The disks themselves come in hard plastic cases with a spring-loaded metal shutter which protects the disk's surface from dust, fingers, etc, when it's not in use. There's no door on the disk drive — you just push a disk in until it's fully home and the drive automatically opens the shutter. Retrieving a disk involves pushing a small button on the front panel, at which the disk pops out, with the shutter automatically closed. The disks are, of course, far more robust than 5¼ inch floppies and, because of the hard case, you can write on the label with no danger of damaging the disk inside.

In Australia, the Apricot will be supplied with two single-sided drives in its basic configuration. Disk capacity is 315 kbytes per drive, but a double-sided option will be available later in the year to give double the capacity. There is also the future possibility of a hard disk Apricot: a 3½in, 10Mbyte winchester disk drive, which will sit in place of one of the floppies.

The machine is based on the 8086 CPU. Unlike the 8088 used in the Sirius, this has a true 16-bit data bus and requires its memory to be arranged in 16-bit words rather than 8-bit bytes. This proved rather an expensive arrangement when IBM was designing its PC over two years ago, hence its decision to go for the 8088, but today the price differential is very small. There is an empty socket next to the 8086 for an 8087 maths co-processor, available as an option.

The Apricot comes with 256 kbytes of RAM as standard and two internal expansion sockets allow this to be expanded to 768k. The expansion bus is peculiar to the Apricot but full details are contained in the machine's documentation to allow outside companies to develop compatible cards — one company is already preparing a full IEEE-48 interface card. Two pop-out panels at the back allow sockets to be fitted for any add-on interface cards. Currently, there are plans to make only two cards — a memory expansion board and an auto-dial modem.

The machine comes with only two I/O ports — a Centronics parallel printer port and a software-programmable serial port. See the 'Systems software' section for details of how this port — and other system parameters — are set up.

The monitor offers exactly the same

REVELA

Here's the one the others

Hottest selling new home computer in UK and Europe – over 30,000 per month – and recently named Home Computer of The Year in France!

Today, you have the choice of more home computers than you can poke a stick at. And, it's fair to say that they all claim to be "the best" – to such an extent that you can't help wondering, "WHAT EVER HAPPENED TO TRADE PRACTICES?" Well, this is all about a computer for the first-time buyer that the others would rather you didn't know about. The Oric-1.

What you pay and what you get.

They'd rather you didn't know that the Oric-1 has up to 64K, yet costs from just $299. It would drive them round the bend if they knew that you knew that the $299 also bought you six true colours in addition to black and white. They'd be frothing at the mouth if you also knew that MICROSOFT® EXTENDED BASIC is part of the price, together with sound that's loud and clear (not just a muddy "bleep"). And they'd be on a guaranteed, one-way trip to the loony bin if they knew you knew the Oric-1 is backed by heaps of software and a 90-Day Warranty which is entendable to 12 months if you wish. There's more . . .

ORIC-1 plugs directly into the aerial socket of your TV.

It also has an RGB outlet if you require colour monitor quality. Text and graphic displays are ultra-bright, giving 40 characters of 28 rows. 8 foreground and 8 background colours can be displayed at any one time.

HIGH RESOLUTION GRAPHICS With Oric you have the choice of full Alpha Numeric computer standard character set, or TELETEXT (CEEFAX/ ORACLE) Alpha Mosiac graphics. The ORIC has, of course, Teletext/Viewdata compatible displays, plus the added bonus of being able to create up to 96 characters of your choice. Add to these features both flashing and Double Height characters and you can start to appreciate the full capability of ORIC-1.

SOUND The ORIC contains a high quality loud-speaker and a dedicated sound synthesiser circuit producing 6 full octaves of controllable sound.

For beginners, 4 programmed sound effects – SHOOT – EXPLODE – PING – ZAP – are available for games, simulations, etc.

You can even programme your own sounds using "SOUND, MUSIC and PLAY" commands, giving the user full control over the dynamics of the sound.

The Oric-1 comes with the 167 page Oric Programming Manual and special demonstration cassette.

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● SUPPORTS LETTER QUALITY DAISY WHEEL PRINTER	✓
● COMMUNICATIONS	✓
● TACTILE HIGH QUALITY KEYBOARD	✓
● AUTO-REPEAT ON EVERY KEY	✓
● FULL CURSOR CONTROL	✓
● SUPPORTS ORIC 3" MICRODRIVES	✓
● UP TO 1.6 MB OF STORAGE AVAILABLE	✓
● WIDE RANGE OF SOFTWARE AVAILABLE	✓
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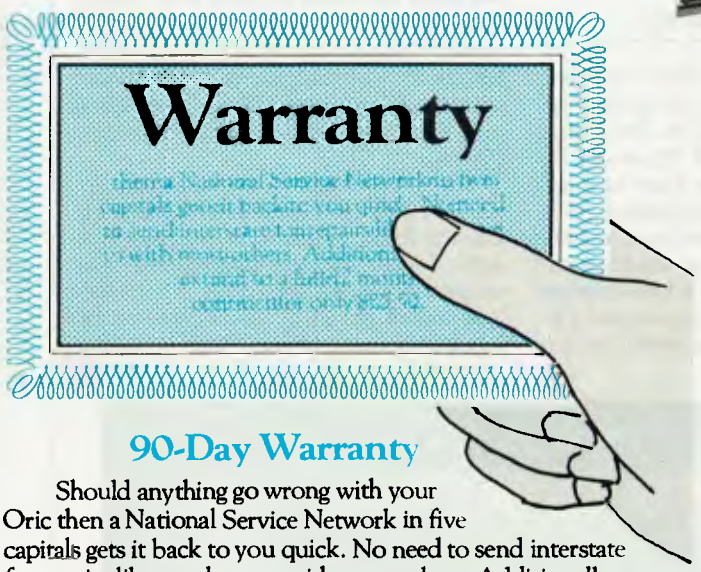

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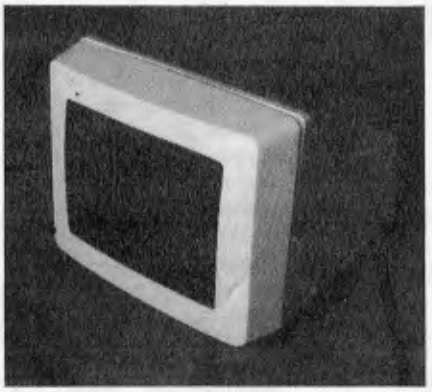
display as the Sirius: 25 lines x 80 characters and 800 x 400 dots graphics resolution. Despite its small size, I found it perfectly clear and readable and it even uses the Sirius character set, which I think is one of the best around. Unlike the Sirius, though, it has a hardware brightness control (the Sirius display — brightness and contrast — is operated entirely from the keyboard). The monitor swivels and tilts and can also slide from side to side in a groove in the lid of the main box. You'd have to be a pretty peculiar shape to be unable to get the monitor in exactly the right position!

Regular *APC* readers will know that I am very particular about keyboards, mainly because a lot of my time is spent processing words and a keyboard can make the difference between writing several thousand words in a day or spending hours correcting mistakes and swearing. Straight away, I'll say that the Apricot has a *superb* keyboard with exactly the right kind of feel to it — for me, that is, as it's always a personal matter.

It has 96 keys and, like the Sirius, almost every key can be programmed to produce whichever character you like or even whole character strings. Attributes such as whether a key repeats when held down and whether its code is sent to the program being run, or is intercepted by the operating system as a display control code, are similarly programmable. The Apricot comes with all the keys set to auto-repeat if held down for a short while. An electronic keyclick is emitted from a surprisingly large elliptical speaker within the main box. Interestingly, the manufacturer found that the cheapest way of providing both keyclick and 'bell' was with a Texas Instruments SN 76489 programmable sound generator chip, as used in many home computers and games machines; as full details of the chip are included in the Apricot technical manual, you could add suitable sound-effects to an applications program — zapping noises as a word processor deletes characters, maybe?

After the width of the Sirius keyboard, it



Monitor swivels, slides and tilts.

feels a little cramped at first but this is mainly because there is no spacing between the main qwerty block, the editing keys and the numeric pad. The keyboard takes its power from the main unit and transmits *and receives* information via a serial link. The system reset key is recessed into the right hand edge of the keyboard and needs to be held in for a second before it takes effect. There's a power-on LED, neatly sited so it forms the dot in the 'i' in the Apricot logo.

If you think the idea of a keyboard receiving information is a little odd, then you have to realise that the Apricot keyboard is no ordinary keyboard. Firstly, it contains a clock/calendar chip (with a 9v battery to power it in a small compartment underneath); and it has its own processor and 'intelligence'. But its outstanding feature is the Microscreen. This is a two-line, 40-character LCD display mounted in the top right hand corner, with a row of six touch sensitive function keys along its lower edge, each of which has its own LED.

When the Apricot is first turned on, the Microscreen displays the date and time. To the left of the Microscreen is a row of pre-set function keys (although of course they can be programmed to produce whichever codes you like): 'help', 'undo', 'repeat', 'calc', 'intr' (interrupt), 'menu' and 'finish'. Pressing the 'calc' key turns the Microscreen into a calculator, with each of the touch-sensitive keys labelled on the Microscreen. One, 'send' will transmit the result of your calculations to the computer so that it appears on the screen wherever the cursor happens to be, just as with the Sirius on-screen calculator. But unlike the Sirius, the calculator software is held in ROM; you can switch the Apricot on and calculate away without first putting in a disk and booting up the operating system.

The Microscreen would be pretty impressive if this was the total of its abilities. But the stroke of genius in its design is to make not only the keys programmable but to allow an application program to download *text* to the LCD. So you can set up labels of up to two lines of six characters for each of the six function keys and change

The keyboard is clearly in a class of its own with its outstanding feature being the two-line character LCD Microscreen. Being a British machine the pound sign is included and will not be removed on versions sold in Australia.

them to reflect the changing role of each key as your program moves from level to level. The arrangement is much tidier than taking up the bottom row of the main display for function key labels and although it makes a program Apricot-specific, the chances are that a good programmer will already have made this aspect of his software easily modifiable to fit various machines anyway — with most business micros (and some home machines) now appearing with programmable function keys, there's really no excuse for an applications package not using them. I will talk more about programming the Microscreen in the 'Systems software' section.

One problem with LCD displays is that you need to be at the right viewing angle to see them properly. Like Tandy with the Model 100 there's a viewing-angle control — actually a small thumbwheel — on the right hand edge of the keyboard next to the reset button. (And because the reset button is recessed, there's no danger of hitting it accidentally as you grope for the thumbwheel.)

Apart from the 'calc' key, the only other pre-set function key which is set up to do anything is the 'print' key; this simply dumps whatever's on the screen to the printer, although this is done in text mode, not graphics. Incidentally, all the function

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keys produce different key codes to the Sirius, although of course they can be re-programmed; as anyone writing a program which uses fancy display attributes (underlining, reverse video, etc) will know, this is the sort of thing which varies wildly between terminals and computers anyway and the appropriate handling routines have to be made easily alterable.

Naturally, there are full cursor control keys, five editing keys, a caps lock with a LED indicator, and a 'stop' key (which generates CTROL-S to stop text scrolling up the screen and which also has a LED). The only omissions I could think of are the screen attributes keys *à la Sirius*; these are actually a nuisance if you hit them accidentally so I re-programmed mine to produce bold and underline on/off toggle codes for WordStar, which is very handy and which I immediately missed when using WordStar on the Apricot.

The keyboard also has a small socket along its back edge for a mouse, although at the moment no suitable rodent had been captured. I get the impression that the manufacturers are as unenthusiastic about mice as I am; but just in case the beast isn't merely another manifestation of Californian trendiness, the interface is there.

That just about wraps up the hardware side of things; the machine is well designed ergonomically as well as from the production and maintenance points of view and incorporates features — particularly the Microscreen — which can truly be described as innovative.

Systems software

The Apricot is supplied with three operating systems as standard, all included in the price: MS-DOS version II, CP/M-86 and Concurrent CP/M-86. I have already written at length in *APC* about the first two of these — they are both single-user, single-tasking operating systems which offer broadly similar user interfaces but have significant differences. I have never been able to decide which I prefer; I have both CP/M-86 and MS-DOS I on the Sirius and find myself using the former most of the time as all but two of the packages I regularly use run under CP/M-86. CP/M -86 wins out on simplicity and straightforwardness; MS-DOS has the friendlier and more forgiving user interface, although with version II it starts to become over-complicated by offering a hierarchical directory structure which is of little use unless you have a hard disk.

Of Concurrent CP/M-86 I can say very little at the moment as time has not allowed me to get to know it much. It allows you to run several programs simultaneously and you switch from one to the other using 'virtual screens'. A more detailed explanation of this follows in next month's *APC* with a fully-blown review of Concurrent CP/M-86.

But it would be inaccurate to dismiss all three operating systems on the Apricot with the above couple of paragraphs as there has been a lot of time and effort put into tailoring them to work with the Apricot and to make all of its features easily accessible to user and programmer. All three operating systems share a basic principle in the way in which they can be implemented on a computer. A large part of the operating system code is written so that it will work with any 8088/8086 computer — the part which handles the disk drives, for instance, falls into this category. However, there is always some information which is specific to the hardware and which changes from machine to machine. This could be as simple a matter as the I/O port addresses or it can be extremely complicated because the computer has unusual or unique hardware facilities — like the Apricot's Microscreen. All of this machine-specific information is confined to one area of the operating system called the BIOS (Basic Input/Output Section) and it is left to the computer manufacturer to write his own, custom-tailored BIOS according to the

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requirements of his machine.

By micro standards, the Apricot BIOS is enormous: look at the MS-DOS memory map and you'll see what I mean. In fact the operating system takes up a bumper 128k or half the basic machine's RAM but it contains some interesting features in the area between 0800H and E000H on the map.

To allow the display's character set to be changed under software control, it is held in RAM. Obviously, there must always be at least one character font in RAM but immediately above this is an area of memory into which an extra two fonts can be loaded, with the machine switching under program control between the two. The keyboard tables are also held in RAM. To explain, the keyboard (like that of the Sirius) doesn't generate ASCII codes but 'logical key codes'; these are trapped by the operating system which looks up a table in RAM containing the autorepeat, etc, attributes and ASCII codes assigned to each key. This is what makes it so easy to reprogram the keyboards on both machines.

A 40 kbyte block of RAM is provided within the BIOS area for use in several ways. Firstly, it can be used as a disk cache, an extra-large buffer which can hold large chunks of files or even entire files, thus speeding up disk operations tremendously. It isn't quite the same thing as a RAM disk (which can also be implemented on the Apricot) as it becomes in effect an extension to a disk drive rather than appearing as a separate, conventional disk drive. This area of RAM can also be used to hold the second and third character sets, or it can be used as a bit-mapped graphics area to provide 800 × 400 graphics resolution display. Just how these choices are made will be explained in a moment.

The primary purpose of an operating system is to provide a standard interface between an applications program and the hardware. Thus, the applications programmer needs to know nothing about how the computer works, what port addresses to use for I/O and all the gory details of the disk system — he simply uses a standard set of subroutines within the operating system to perform these functions, with the result that the program will work on any computer equipped with the same operating system.

When handling I/O to the disk, the operating system uses files — the things you see listed when you ask for a display of the disk directory — and this same method is used for other I/O channels such as the printer and console, usually with the names "PRN" and "CON" respectively. ACT has built another I/O file into its BIOS, called "MSCREEN" for sending text to the Microscreen, as mentioned earlier. For example, from Microsoft Basic you would do something like:

```
10 OPEN "O",1,"MSCREEN"
20 PRINT #1,"A MESSAGE TO THE
     WORLD"
30 CLOSE 1
```

to get the text A MESSAGE TO THE WORLD onto the Microscreen; the message appears when the file is CLOSEd, not when you actually print it, so you can send a screenful of key labels, etc, and have them appear instantaneously as soon as the file is closed. Using the Microscreen as a calculator erases the display temporarily but it is restored when you turn the calculator off. A whole range of escape codes is available to scroll text, move the cursor around, etc, on the LCD. A simple escape code will restore the time/date display for neatness at the end of the program.

The clock/calendar in the keyboard is, incidentally, fully interfaced to MS-DOS so that when the system is first booted up it gets the correct time and date from the calendar and you don't need to type these in after every reset, unless of course they're wrong for some reason, in which case, resetting them from MS-DOS also resets the clock/calendar chip and — if it's displaying the date and time — alters the Microscreen display too.

The main display driver uses the same escape codes as does the Sirius, and the two machines are virtually 100 per cent software compatible — I transferred a couple of packages from the Sirius and they ran perfectly with no trouble at all. In fact the only area of incompatibility I discovered was with the codes generated by the function keys.

There have been a few tricks added to the Apricot which aren't — sadly — available on the Sirius. By sending ESC "," to the screen, you can define a screen window by following up with the top line, bottom line, left column and right column numbers. This is almost — but not quite — full windowing, as what it actually does is confine all further activities on the screen to the area you have defined and you can only set up one such area at a time. Escape "," restores the 'window' to the full screen size. There is also a group of escape codes which allow you to scroll the display up, down, left or right by a specified number of characters, although not many applications packages can be configured to use these — I'm still looking for a word processor which I can set up to display underlined or bold characters on the Sirius screen using the display's underline and bold capabilities.

Utility software

Utilities are programs which allow you to perform various 'housekeeping' chores like configuring the serial port, formatting disks, etc. Some are provided with each operating system and, generally, a computer manufacturer will throw in a few more specific to his machine.

The manufacturer has done a great deal more than 'throw in' a few utilities to take advantage of the Apricot's facilities. Recognising that most of the users in today's business micro market have neither the time nor the inclination to learn about computers — they just want to *use* them — the Apricot has been provided with what must be one of the friendliest and easiest-to-use set of utilities on the market.

Firstly, there's a program called the 'system manager' which really is rather more than a utility. The idea is that the user should never have to see the 'A>' prompt of the operating system, unless he deliberately chooses to. Instead, almost everything can be handled from the manager, a friendly, menu-style 'front end' specifically designed for ease of use by a 'computer-naive' user.

The system configuration package is the best I have ever seen and makes beautifully easy the whole — usually messy — business of programming the serial port baud rates and framing, choosing the normal character set and keyboard table and setting things like the keyclick and bell volumes,

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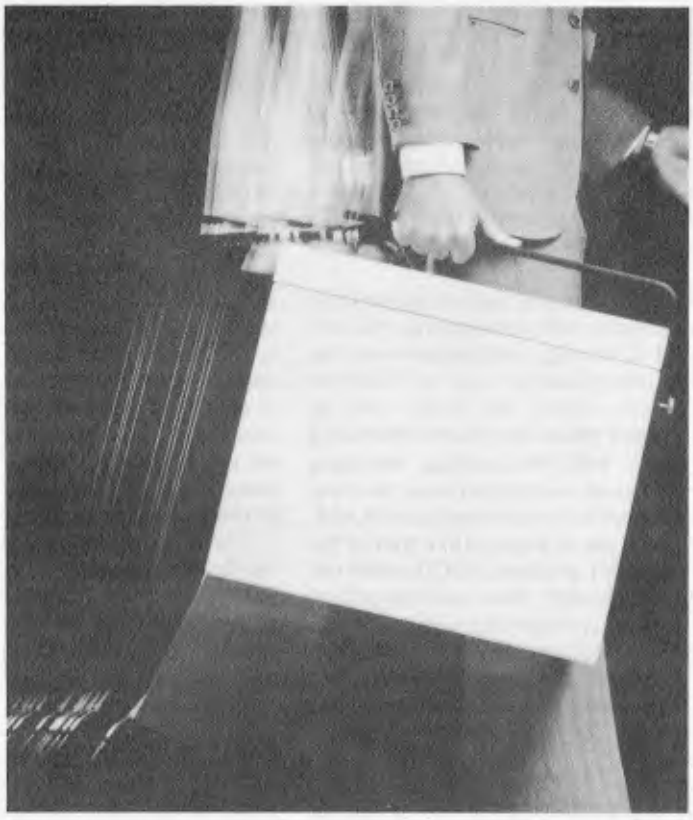

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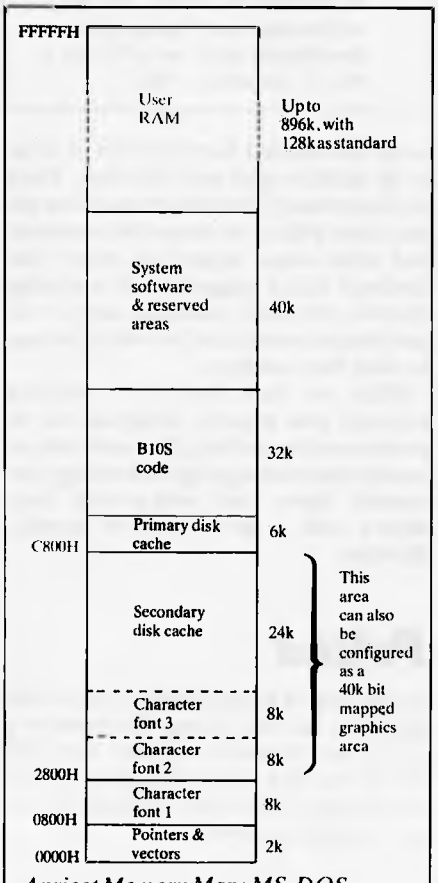
the length of the delay for which a key must be depressed before it starts to auto-repeat and the speed at which it repeats. The click and bleep volumes, for instance, are depicted graphically rather than as numbers

The configurator also allows you to choose how that big block of memory in the BIOS is used. No technical questions are involved, simply a choice of using the Apricot for software development (no disk cache) or for applications (big disk cache) or for graphics.

All this information is kept on disk and the configurator displays the current settings as you work through each item. Once you've finished, the new configuration is written to disk and can be transferred to other disks, too, along with the operating system, or you can set up different configurations to suit different applications. Although you can set up these configurations on the Sirius, you have to rebuild the entire operating system to use them, which is not really satisfactory.

Like the rest of the utilities, it uses a graphical device, called the ladder, to act as a menu, and choices are made by flicking this up or down with simple keystrokes (or with a mouse, even). It also incorporates a help facility which provides on-screen descriptions of each operation and each choice.



Apricot Memory Map: MS-DOS Operating System

Other utilities include editors for character sets and keyboard tables which allow you to generate your own very easily and simply; these can be saved on disk too, again a better arrangement than on the Sirius. There are utilities which allow you to change the character font for another on disk, and restore the original afterwards, and there's one which does the same for the keyboard tables. At the moment, an applications program could only take advantage of these if the appropriate commands were inserted in a batch or submit file, but a later release of the BIOS will allow this to be done within an applications program. The Apricot also has its own print spooler (curently for MS-DOS only) which will print out text while you carry on with something else and there's an asynchronous communications package which comes with the machine.

Languages and applications

As supplied, the Apricot comes with Microsoft's Basic interpreter and run-time support packages for compiled Microsoft Basic and Cobol programs, and Digital Research's Personal Basic interpreter. Of Microsoft Basic we have already written *ad nauseum* in *APC* in the past. I was somewhat surprised, when I ran the Benchmark timings to discover that, while the Apricot is well up on the speed list, it was still slower than the Sirius (on which I re-ran the Benchmarks, as the timings published with the Sirius Benchtest were taken using a pre-release and *very* inefficient version of Microsoft's Basic 86).

Unfortunately, DR's Personal Basic was not available by the time this Benchtest went to press so I can't comment on it; in any case it deserves an article of its own . . . The same applies to the Digital Research graphics module GSX, which will run under all three operating systems. This frees the graphics programmer from hardware considerations in the same way as operating systems do for more mundane tasks and DR plans to incorporate it into its operating systems eventually. The idea is simple: as details like screen resolution and available colours vary widely between machines, it's a real pain trying to write a graphics program to run on more than one specific computer. GSX provides a standard interface to an applications program so that as far as the programmer is concerned, he is writing for just one machine. When a manufacturer installs GSX on his computer, he gives it details of his machine's actual capabilities just as he configures an operating system BIOS and GSX then translates the program's graphics instructions into the nearest actual operation possible on the machine.

An impressively hefty range of extra-cost software will be lined up for the Apricot by launch time. On the languages side, there will be Microsoft's Basic, Fortran, Pascal and Cobol compilers as well as its Macro86 assembler. From Digital Research comes the CBasic86 interpreter and compiler, C, PL/1, Pascal MT+ and CIS Cobol LII compilers and the ASM86 assembler, plus DR's DR-Graph, DR-PLOT and DR-4010 graphics packages.

Applications packages on the machine include word processors (one of which is Wordstar), spreadsheets, dBaseII and the usual accounting packages available in Australia.

Expansion and potential

Double-sided disk drives are in the pipeline, as I also mentioned earlier. With over 600 kbytes available on each Sirius disk (yes, I have the cheapo single-sided version), I have become rather spoilt on disk capacity and was at first surprised at the speed with which I filled up an Apricot disk; the double-sided drives would be a very cost-effective extra. As to when the 10 Mbyte hard disk will be available, well, no decision had been taken at Benchtest time, either on time or cost.

Certainly other companies will be adding to the range of options with suitable plug-in-boards — expect at least one Z80 board with CP/M-80 option. With only two expansion slots inside the machine, though, you'll have to limit your choices severely as continually taking the lid off to swap boards is a bit silly. Looking at the PCB, there's no way that another slot or two could have been added without making the whole machine bigger and by its very small 'footprint' is an obvious selling point in the battle for space on the office desk top.

With Concurrent CP/M-86, you would probably need extra RAM if you wanted to run numerous applications simultaneous-

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ly. Memory is getting cheaper all the time and it certainly pays — with any machine — to buy as much of it as you can afford. I think, though, that if you need lots of extra I/O ports or all sorts of esoteric extras, the Apricot probably isn't the machine for you — it certainly wasn't designed with this type of user in mind — and you'd be better off with a Sirius or some other machine with greater expansion possibilities.

Networking is the way that office systems are going and some type of networking will be available on the Apricot. As the rest of the machine is so Sirius-compatible, I expect this to be compatible with the Omninet-based Sirius networking, too.

Technical specifications

CPU	8086, 5MHz, optional 8087 maths co-processor
RAM	256k expandable to 768 kbytes
ROM	?k bootstrap ROM (also contains calculator software)
Display	25 lines × 80 characters, 800 × 400 graphics 2 line × 40 character LCD Microscreen display on keyboard
Keyboard	96 keys inc 8 pre-set function keys, 6 programmable touch-sensitive function keys, cursor control, numeric pad
Disks	One 3½in microfloppy drive, capacity 315 kbytes, optional second drive, optional double-sided 3½in drives
I/O	One RS232, one Centronics parallel interface, mouse interface, optional audo-dial modem card
Software	
System	CP/M-86, Concurrent CP/M-86, MS-DOS II, utilities
Languages	Microsoft & Digital Research Basic interpreters, Microsoft Basic & Cobol compilers run-time support; large range of optional languages

Documentation

The worst aspect about the Sirius when it was launched was that while the machine quite obviously had some great features — there was no way to use them, neither in the form of software nor manuals to let you write your own. The information did eventually trickle out of California and a few bright people figured it all out anyway, but even today there are aspects of the machine which remain poorly documented.

With the Apricot, full technical details, hardware and software, will be available so there'll be no excuse for programmers pleading ignorance as a reason for not using the machine to the full.

Conclusions

The Apricot is designed for a specific type of business user. It is aimed primarily for the person with a fairly limited range of applications to perform who dosen't want to pay a lot more for a Sirius-type of machine. At the moment, this user is forced to go for an 8-bit micro, and although there are some very good 8-bit machines around, the 16-bit machine is taking over with increasing impetus, especially now that there's plenty of 16-bit software around.

I will confidently state that the Apricot is the best micro I have yet seen in terms of its facilities and user interface. There are faster machines around and there are machines with more powerful processors and what some regard as more 'professional' (i.e. a bugger to use) operating systems, but none combine ease of use and relative power into as neat a package as does this machine.

What we have here is a machine precisely and expertly designed for the modern micro market; it incorporates no barely-tried leading edge technology, just careful, clever and well-proven techniques and a good deal of original thinking.

Benchmarks

BM1	1.6
BM2	5.2
BM3	10.6
BM4	11.0
BM5	12.4
BM6	22.9
BM7	35.4
BM8	34.4
Average	16.7

All timings in seconds. For an explanation and listing of the Benchmark tests, see APC Vol 3, No 11, November 1982.

Prices

At the time of going to press, prices have not been set but Barson Computers is saying that the basic machine with 256k RAM, two 3½in single-sided microfloppy disk drives, monitor and software will sell for "well under $5000".

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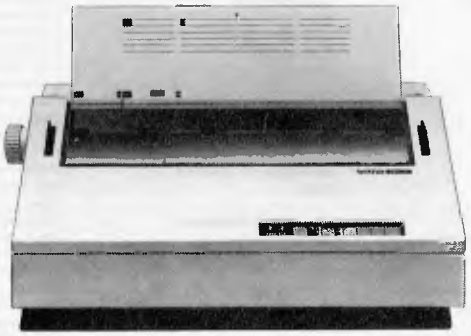

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THE FINANCIAL PLANNER

Ashton Tate tries its hand at financial planning for the IBM — Pete Fawcett tells you more.

Ashton Tate is more or less a household name in software, on the strength of its file-handling package dBase II. But now the company is trying its hand at other kinds of application software packages, and this new IBM financial planning package is one result of this policy.

The Financial Planner is only one of dozens of packages of its type, used for applications ranging from simple budgeting and cash-flow analyses right up to building complex business planning and accounting models. Financial planning packages vary a great deal in their scope and complexity though, the simplest being the popular spreadsheet packages such as VisiCalc.

The Financial Planner, on the other hand, is in the more advanced league. It's specifically aimed at the experienced user, particularly those people who may have found the simpler spreadsheets not powerful enough for their needs.

I tested out the Financial Planner on a large IBM PC under PC-DOS. The version I tried was number 2.36, which does not include any graphics features — due soon, according to Ashton Tate. There's also a CP/M version of the packages available, which is limited to only 30,000 cells of information.

The 16-bit version which sells for $826 (excl. tax) is also limited to that size at the moment, but the newer version due to be launched shortly should be able to cope with 62,500 cells.

Presentation

The Financial Planner (FPL) comes with a large black ring-binder manual, packed with 240-plus pages of text, and several appendices. The software comes on disk, and there's a separate demonstration disk.

The manual is shot through with technical jargon, and it's aimed squarely at the advanced user.

I found looking up points for reference a real problem. The manual is not really designed to let you locate particular chunks of information in a hurry. There is a useful separate reference card, but if you want more detailed descriptions of the operations you can carry out, you are in for a long search through the manual.

Features

FPL features — as you might expect — the tools you will need to allow you to create and modify financial models. Models are set up in spreadsheet format, with a maximum limit of 30,000 cells. Row and column names are up to eight characters long, and rows and columns may also have titles of up to 100 characters, which can be displayed on the reports you produce.

A set of editing commands lets you pick the format in which data in your model is to be displayed — number of decimal places, dollar signs, underlining, overlining, plus or minus signs, credit or debit signs, percent signs, and so forth.

You have a reasonably comprehensive set of rules at your disposal with which to manipulate your data and compute the model. Rules may operate on cells or variables, rows or columns, read from or write to files or accept input from the keyboard, and there is a LOOP command to repeat execution of a set of rules until the difference becomes insignificant.

You can use the full set of logical operators to build rules — greater than, less than, less than or equal to, and so on. You can also use AND, OR, IF, ORIF, THEN and ELSE. Then there is a comprehensive set of arithmetic functions ranging from MAXIMUM, MEAN, running total, rounded values and fractional part through to arctangent, log, cosine and square root.

There's a set of report commands which you can either execute immediately or save as a file to be run later. You have control over the precision to which your data is displayed, you can add footnotes to a report, take commands out of another file, and pick the rows and columns to be displayed and the space between them. Various other commands are available.

Getting started

After finally succeeding in loading the package, I was launched straight into the following menu:

1. EDITOR
2. DSS
3. SELECT
4. RESTART
5. MODEL
6. EXIT

The editor is that section of the package where you create or modify models. The DSS is the decision support system used to process the model. The other options are used for a variety of secondary functions. I did not use this menu, however — it was quicker to use the commands directly. The rest of the system is command-driven rather than menu-driven, anyway.

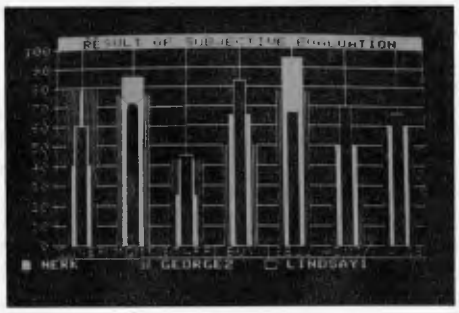
I tried booting the demo, only to be greeted by a sequence of screens that flashed through an example at such speed that it was impossible to read more than a couple of words on any screen. Once it had finished, I discovered that it was possible to change the configuration of the demonstration and set it to either a slow scroll or to manual mode. Following the tutorial sessions does bring you to a level of familiarity quickly.

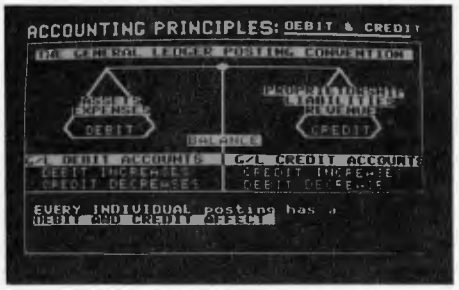
In use

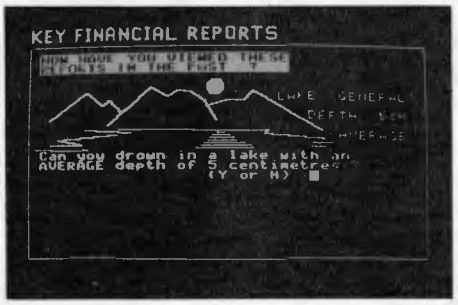
Many of the commands are less than obvious, and they are none too straight-

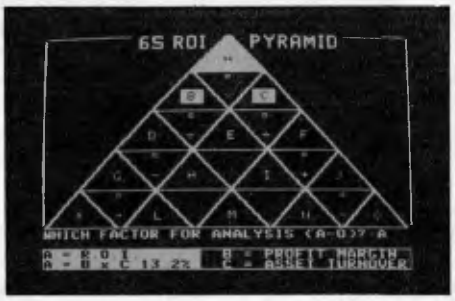
If you really want to know — ASK!

Small business needs a key to the accounting scene.









What advice would you give these people?

EXAMPLE 1
18 months ago Mr L. was worried by declining custom due to a large department store nearby. He decided to fight back by reducing profit margins, while increasing floor space, merchandising lines, his advertising. A 'bulk store' approach. All these changes required extra capital and extra effort. He now has his first full twelve months trading results.

Is this the BETTER way to operate? PROFIT is only part of the answer.

EXAMPLE 2
Mr C. started a business 36 months ago with $10,000 capital. From a slow start, things appear to be heading in a positive direction, with steady sales increase. However, more capital is needed to fund charge customers and increase merchandise inventory.

Does PERFORMANCE justify this? Is the business capable of servicing these added overheads?

A.S.K. and get the answers!

STAGE 1 — INITIAL EVALUATION
ASK! provides a SUBJECTIVE EVALUATION tool — a questionnaire. The surveyed results are computed and graphically illustrated. The program will then advise you on what it believes your apparent strengths and weaknesses are. Interesting stuff!

STAGE 2 — REVIEW OF ACCOUNTING PRINCIPLES
Numerous illustrations and spot tests are employed to ensure that each aspect is kept understandable and interesting.

STAGE 3 — RETURN ON INVESTMENT
Let the 6S ROI PYRAMID unravel the complex relationship between INCOME EARNING and ASSET MANAGEMENT. A fascinating analysis that helps you make a range of professional accounting adjustments to the figures to show the REAL PICTURE.

STAGE 4 — IN-DEPTH TREND ANALYSIS
A data-base is created. From this database a range of analyses is performed.

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A user of ASK can not only see where he has been more clearly, but also is able to plan with confidence where he is going!

This is a program for Apple II, and Apple IIe computers.

All inclusive cost for the six diskette set, manual and protective folder — **$295.**

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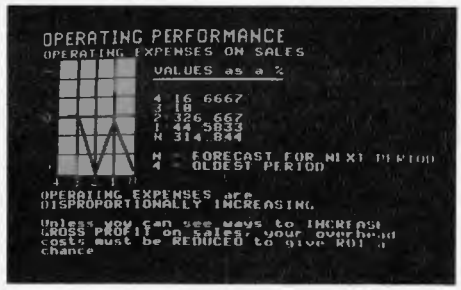

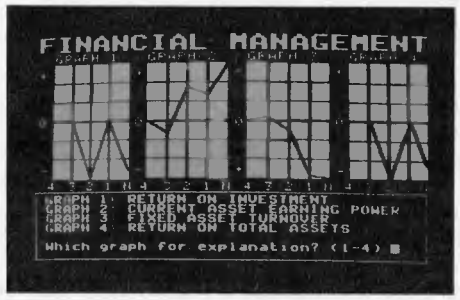

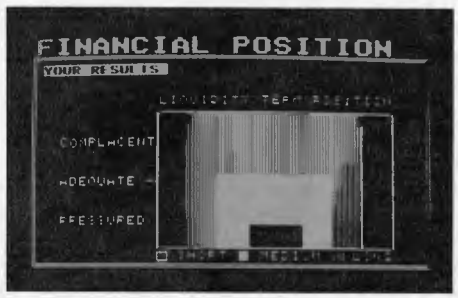

forward to handle. The functions of STET, MATHCELL, DEFINE and #120 are not immediately obvious.

The way in which the package works is also constraining compared with spreadsheet packages. To do a simple financial plan, for example, you must first define all your data, then define the rules by which you wish to manipulate that data. Only then do you run your program, and at this stage you may discover that it will not work due, most probably, to a syntax error you have made in using the commands, or a missing comma in the data section.

What this means is that you then have to go back and try again, until you have corrected all the problems that may turn up. This is a slow and rather annoying process.

There is a Help function, but in practice it is of little more use than what is in the manual anyway. So you are left to switch backwards and forwards into the editor function, and back out into the package proper, whenever you commit illegalities such as using names with brackets or spaces in them in your formulae.

This eternal switching back and forth to the editor means you will need to have a high degree of perseverance if you are to get your program developed. Despite these drawbacks, though, the facilities are very powerful, especially compared with VisiCalc. You go about using Financial Planner as follows:

Developing a model: To develop a model to represent your personal budget, say, you must first define the rows and columns you require, including the row and column descriptions you wish to use. Having specified your model's layout, you are ready to enter data into it.

Data entry is rather messy, since all you have to do is get a comma out of place and your data goes in incorrectly. It is not possible to move around the model as you can with the spreadsheets, which I found restricting. There are some nice features, however, such as 'Repeat this figure throughout the matrix, but growing by 9% each year'.

I found that the models ran into trouble with large numbers. The package tried to truncate the figures and convert them into exponential values, but this did not appear to be working properly, and all that was left were garbage figures.

Processing the model: In order to manipulate the data in your model you have to enter logic rules. The number of rules you can apply is large but you have to specify them without being able to refer to the model, which is not easy.

Within your rules, you can LOOP, you can READ or WRITE other files and you can specify keyboard INPUT. You can also make use of report commands, but I found these commands less than friendly to use.

Once all this has been done, you are ready to DEFINE and COMPUTE the new model. This is the point at which errors inevitably get reported, and here the package is not very flexible.

Performance

I found that for small models, the speed of this package was quite disappointing whenever I went into or out of the editor, or whenever I computed the model. This effect was worse with larger models; with one of 200 rows and 20 columns it took more than two minutes just to reserve the space — and further progress was very slow indeed.

There is a theoretical limit of 500 rows and columns, and a constraint of 21k on file size.

It appears, though, to be practical to use only much smaller models, owing to the severe performance drop-off as the model size increases.

Reliability

Generally the package did what it claimed it would do, but several bugs crept in. Mysterious @ signs appeared from time to time on the screen for no apparent reason. The AD instruction did not work, and I managed to crash the system with a COMPUTE command.

The package responded with Error 99 and threw me out of FPL — losing my file in the process.

I also found that the Workfiles option on the menu didn't work, but simply threw me out of FPL when I tried to use it. And when I attempted to read a file that was not there, the system promptly hung.

Conclusion

Like dBase II, this is no system for novices or for end-users; some fairly heavy-duty programming is needed to produce a working model. It is a powerful package and can be used for some very advanced applications, but it will most often be used to develop complex models such as sophisticated budget plans or complicated accounting analyses.

Even so, I have doubts about the reliability of this package as it stands. Compared with similar and rather more powerful packages, the Financial Planner seems to be less robust; and it does not handle large models particularly well.

I found the Financial Planner quite unfriendly to use. I shall continue to make do with VisiCalc whenever I can.

MODEL III

★ DISK CONTROLLER
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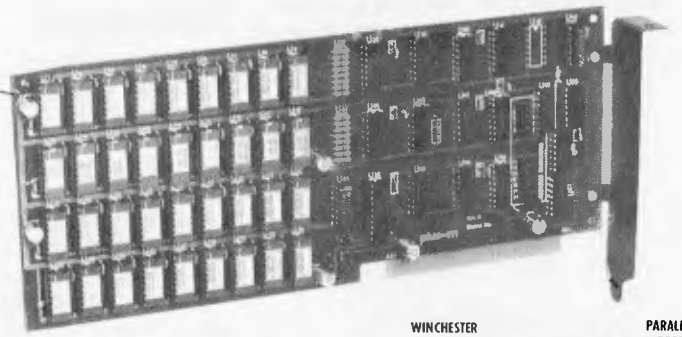

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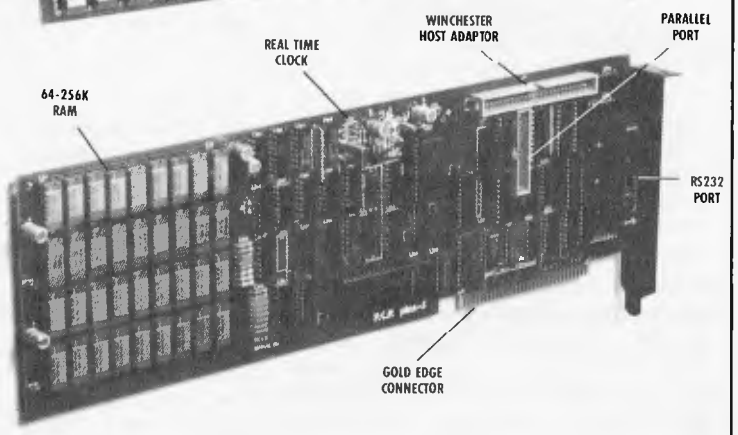

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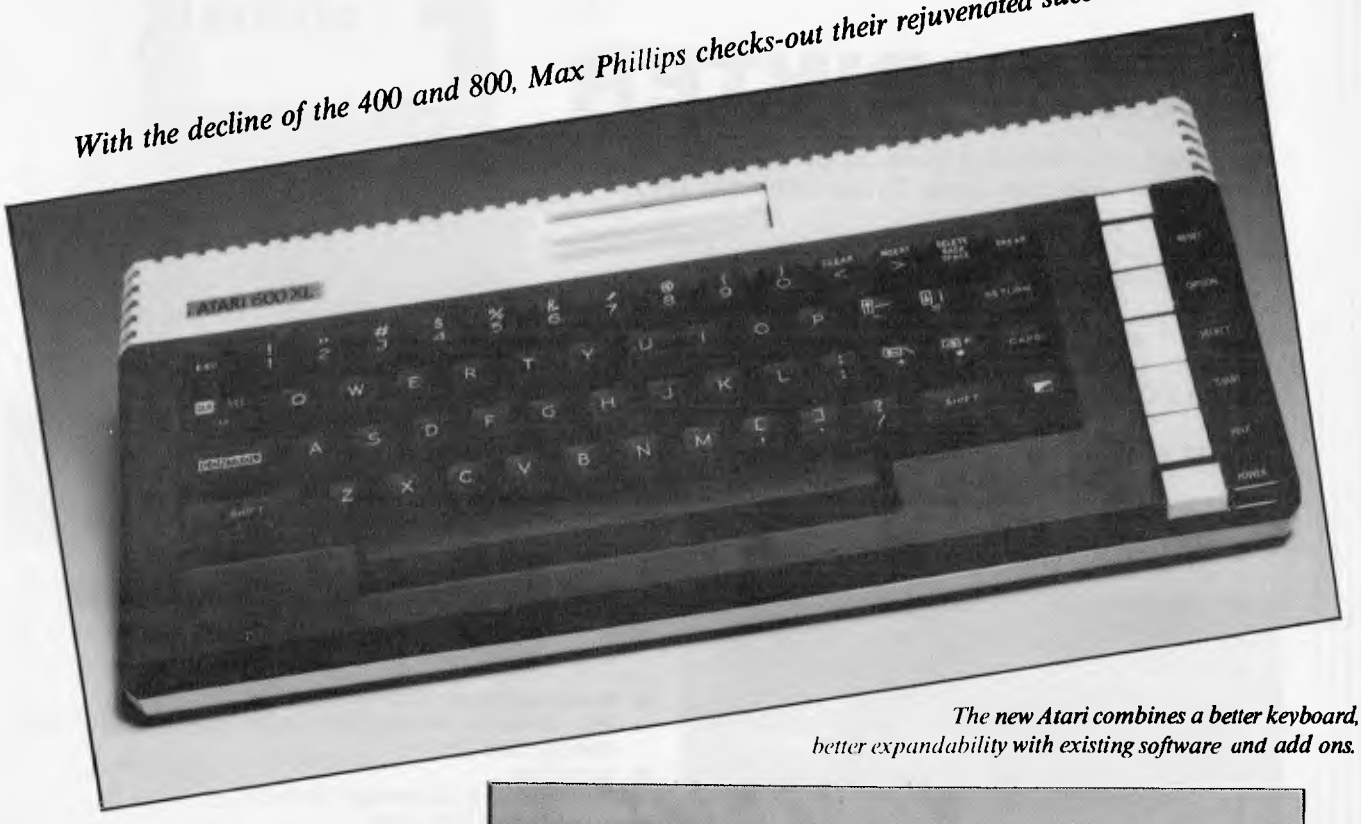
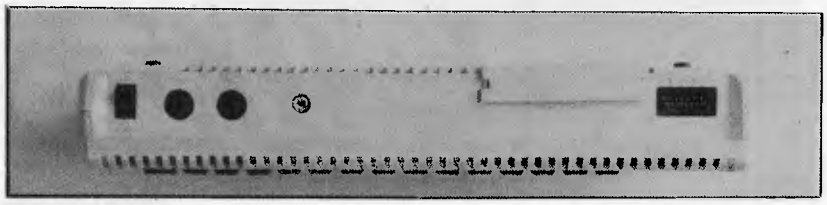
CHECKOUT

ATARI 600XL

With the decline of the 400 and 800, Max Phillips checks-out their rejuvenated successors.



The new Atari combines a better keyboard, better expandability with existing software and add ons.



The 600XL has outputs for TV and monitor, a standard Atari peripheral port and a new Parallel bus.

As new micros go, the Atari XL range is almost unique. New machines are usually late, full of bugs and teething troubles and desperately short of software. Atari has simply modernised its one machine — based on the 400 and 800 models. So bear in mind this is a very mature system — tried, tested, understood and supported.

There will be two models, a 16k and 64k model. A third baby due in 1984 is the 1450XLD — a 64k machine with built-in disk drives, but we may not see it in Australia.

Unlike previous Ataris, the company will be offering official upgrades between models. Planned launch date and prices are not yet finalised for all the new products but the 600XL tested here will sell for $399.

Presentation

Atari has stuck with its spacious and futuristic packaging. The machine itself if beautifully styled and miles apart from the cheap seventies science fiction look of the 400 and 800.

The only flaw is a comical looking cartridge socket covered by two flimsy metal doors. Instant reaction from almost everyone who has seen it is to poke their fingers in! It's also worth noting that although the 600XL runs with existing add-ons, it looks a bit out of place sitting next to them.

Documentation

The 600 will be supplied with an Owners Guide and a 14 page introduction to Basic. We did get the flimsy Owner's Guide but the Basic booklet wasn't available.

The content is typical of Atari packaging. Oversized and mostly empty. The Owner's guide does go very quickly through the basics — setting up, self tests, keyboard and plugging cartridges in. There are even three little Basic programs for you to try.

Atari relies very heavily on its users to learn about their machines. It may be necessary to buy a Basic tutorial. This may have been reasonable in the days

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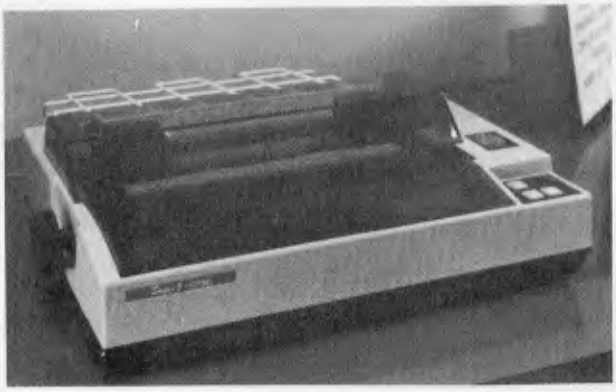

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when a 400 didn't come with Basic, but the 600XL does and it should be documented. You'll also need Atari-specific magazines to keep you in touch and up to date.

Construction

The 600XL is superbly built — particularly for $399. The machine is solid and produced with quality components.

Inside, the main board is covered in metal sheeting to comply with America's radio interference laws. This prevents you getting at the chips with ease — well alright — it makes putting it back together again a real problem! For those who are interested, the new machines are made from the same recipe as the old — 1 6502C and Atari's custom chips GTIA, POKEY and ANTIC.

The power supply is merely an improved version of the original units. A different plug stops you swapping new for old.

The other curio is the cartridge socket. Old Ataris were famous because they automatically cut the power supply when a cartridge was changed. This was supposedly to protect both machine and cartridge from possible damage and it also offered an automatic start whenever you swapped programs.

The new socket doesn't cut the power and it doesn't hurt the cartridges. Occasionally you'll hang the system by doing it and unfortunately you do have to hit reset to actually start a new cartridge going. Still, it's better than machines where you have to switch on and off to swap catridges.

Keyboard

The 600XL is blessed with a superb keyboard, which is, for the most part, a standard Atari layout.

There's a separate row of general purpose control buttons — Reset, Option, Select, Start and, a newcomer, Help. These make running commercial programs a real pleasure. Coupled with the Atari's ability to auto-start disk, cassette or cartridge programs, you rarely have to go near an instructions sheet to get a game going.

The only key that seems to be missing is a Pause key — useful for telephone calls, sore trigger finger or whatever. Of course, many games would be ruined if the user could freely stop and start them. But it would be a programmer's decision to implement the key or not.

When you are actually programming the machine, the keyboard suffers from too many two fingered and often two handed combinations. The screen editor is driven with Control and Shift combinations plus editing keys on the far end of the keyboard. And there are a few sneaky unlabelled combinations — Control and 1 pauses screen output for example.

The standard control keys Control A-Z generate an antique range of PET-style predefined graphics. The keys themselves aren't labelled, so for the first few weeks you'll need a keyboard chart cellotaped to your bathroom mirror.

The XL machines also have an international character set added to their repertoire and these are available in exactly the same manner as the predefined shapes. To switch between the two, you need to be in Basic and use the elegant and memorable POKE 756,204. If you aren't using Basic, you have to hope that whoever wrote your program has remembered to provide a switch.

Atari has abandoned its logo key. This used to switch between inverse and true video. The key is still there, but the legend is now an equally inpenetrable divided square that looks like it was stolen from a book on semaphore.

Screen

The XL machines plug straight into a TV and the 600XL also has the welcome addition of a monitor output. This drives

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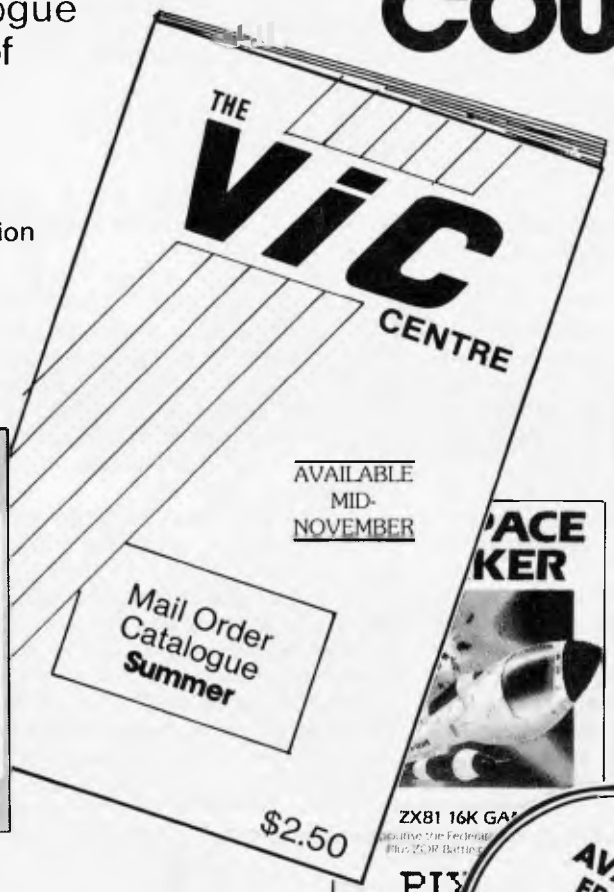

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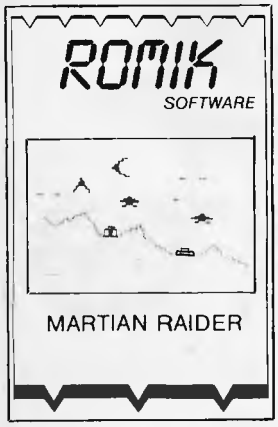

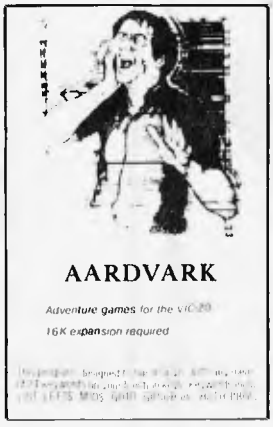

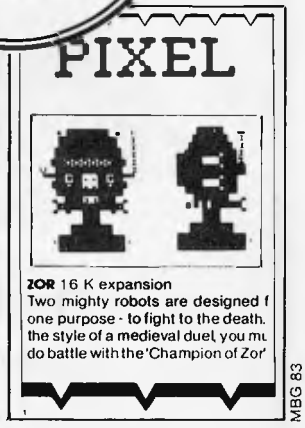

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a Composite monitor. The TV picture is a little disappointing although this could simply have been our early machine or our particular TV.

Regards actual capability, the screen is virtually unrivalled. The Ataris are capable of 16 colours at 16 brightness levels — though all 256 can't be done at the same time. The 600XL supports 16 different screen formats (or modes) — 32 if you count being able to switch a four line text window on and off at the bottom of a graphics screen. This is an improvement on the 12 modes offered by recent American 400s and 800s (those fitted with the GTIA display chip) and the nine offered by the original CTIA chip systems.

The modes allow you to select between available colours, graphics resolution, text and double height text modes and so on. The maximum resolution is 320 x 192, with the corresponding text format being 24 rows of 40 characters which seem a little old-fashioned.

The lack of 80 column text is a bind for serious use though people who use Atariwriter seem perfectly happy with it. The lack of graphics resolution is insignificant. High resolution screens are useful for Computer Aided design, art, business and mathematical graphics — large, static and detailed displays.

The Ataris have always been unashamed games machines where the lack of resolution is rarely noticed. Besides, Atari has provided far more important facilities for games writers.

For starters, there's player/missile graphics — Atari's rendering of sprites. The 600XL can control moving objects on screen in hardware providing for fast, smooth arcade games. You can use them yourself though it isn't a simple task from the built-in Basic.

Other useful tricks are smooth scrolling in any direction and the ability to reassign the colour palette at will. The result is that the Atari plays arcade games as well as any TV game and almost as well as many arcade machines. All in the comfort of your own home.

The only thing that seems to be missing is user defined characters. Of course, you don't need these for games because you can use player/missile graphics. But they would be helpful for more serious programs in areas like maths and education.

If you ignore the gradual improvements to the system, Atari does seem to have developed a remarkable display system years ago. It is still a target that others have to follow.

Storage

The Ataris have three storage systems, cartridge, cassette and disk. The cartridges give the machine its TV game ability, allowing non-technical users to buy it as a plug-in-and-go console.

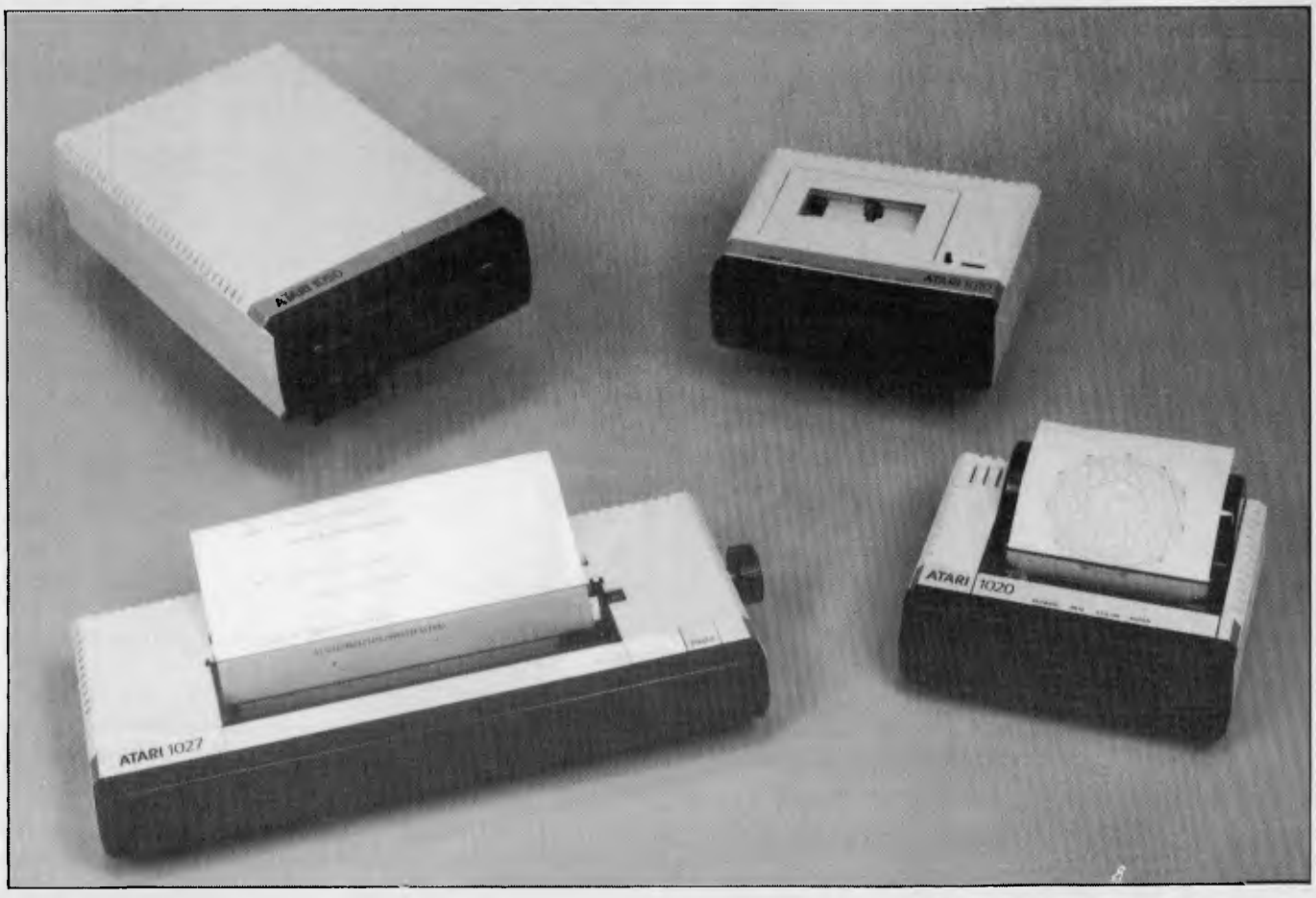
Next up is the dedicated cassette recorder system. Atari produces its own recorder. It does take some effort to convert a standard cassette recorder for use with the system. The advantage is full remote control and superb reliability. The disadvantage is that it pushes the cost up making the 600 a very expensive 16k system.

One of the much imitated tricks is the audio track on the cassette recorder which can be reproduced via the Atari through the TV. This allows programs such as a foreign language tutor to reproduce genuine foreign speech under computer control.

Finally Atari offers a disk system with its own DOS. However, the 600XL really needs its memory expansion to make the disk system practical. You can use the elderly 810 disk drive with a horribly crammed 88k per disk or a new model 1050. This uses a dual density format to provide a small 127k per disk. One drive can be connected straight to the 600XL and if you use the 850 interface module up to four drives can be connected.

Expansion

The 600XL is very expandable simply because it's quite happy with existing 400 and 800 peripherals as well as a range of



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new add-ons to coincide with the launch of the XLs. The basic expansion is, of course a 64k memory module to bring the 600 in line with the big boys.

It also has the standard 'peripheral' interface as well as a new parallel bus. 'Peripheral' allows you to connect either a single unit such as a cassette recorder, disk drive or one of the new Atari printers. These are an 80 column dot matrix printer, a low cost letter quality printer and a four colour printer/plotter. Alternatively, there's a multiple interface box to which it can be connected.

The new machines come into their own with an Expander box. This uses the parallel bus and so, unlike the other new add-ons, can't be bought for the 400 and 800. The Expander has dual RS232 interfaces, a Centronics port and eight free slots for lots of goodies, both Atari and third party. Products already being whispered about are an 80 column board, clock, hard disk controller, VCS card and many more.

Atari is also planning a CP/M box providing the machines with a Z80, CP/M 2.2 and an 80 column video display. So, in theory, the 600 joins the ranks of home micros that can grow into full business machines. So, although in terms of actual performance the 600 doesn't offer that much over a 400 or 800, it has a much better expansion capability. Coupled with the new keyboard, the 600 comes across as a much more serious hobbyist computer than its games playing pre-decessors.

The only sad loss is that the 600XL has only two joystick sockets instead of the usual four. Most of the time users won't even notice. But there's the odd piece of vitally important software that only comes into its own with four joysticks.

One bad habit of Ataris in general is their mad desire to leave you in a heap of spaghetti-style wiring. Many of the peripherals require their own power supplies and some of the boxes used to connect them need their own as well. Hopefully, the expander box will help tidy up an expanded system.

Basic

The 600XL breaks new ground for Atari because it has a built in Basic. However, it's not a new Basic, its the same interpreter that comes on cartridge for the 400 and 800.

It is a simple Basic, very similar to an 8k Microsoft like those supplied by Apple and Commodore. Parts of the system are very nice to use but it does have some limitations not least of which is that it is rather slow.

On the plus side, Basic has a delightful screen editor using the four cursor keys with insert and delete line and character. Many basic keywords can be simply abbreviated. Basic variable names can be of meaningful length and many simple errors are echoed with a cursor highlighting the position of the mistake.

Less friendly to the beginner are the majority of run-time errors which generate error codes rather than messages. Many of the machine's really special facilities require you to start messing about with fiddly PEEKs and POKEs. Even those features which are supported, e.g. SETCOLOR, are frequently better controlled with POKE.

So Atari Basic is perfectly adequate as a home computer language. There's nothing wrong with learning it as your first language. But be aware that there are more sophisticated versions of Basic available on other machines.

Software

Software is the real clincher for the Atari systems. Its ancestry in arcades and TV games has given rise to a vast catalogue of professionally written and produced software. Contrary to first impressions, Atari software spans the whole spectrum — games, education and business, though you'll find that a lot of software is American in nature — okay for games but useless for education.

The Atari is a stable games machine. Besides the many packages which start life on the machine, most hits from the arcades and other micros eventually find their way onto the machine. As a games playing tool, there is little to rival it.

In business, the Ataris have a handful of successful packages. The original VisiCalc is available and word processing is catered for (even on a 16k 600XL) by Atari's own Atariwriter. The hobbyist isn't going to feel abandoned either. Available languages include 6502 Assembler, Forth, Pilot and a Microsoft Basic if you have a disk system. Expanded system can even run a full Pascal.

The drawback with Atari software is simply cost. Many packages come on cartridge — a medium which still seems to cost the Earth. So with the Atari you do pay extra for the quality and convenience.

Verdict

The XL range is very mature. It's one of the few new computers you can buy that offer a ready-made software and add on market. The system is, as its always been, a remarkably good piece of design.

The 600 takes the Ataris further away from being games machines and much more into serious hobby computing. Performance wise you don't get much over the existing 400s and 800s — if you're interested, keep an eye open for bargain special offers. What you do get is a computer with a superb keyboard with a serious expandability. When Atari delivers add-ons such as the expander box and CP/M system, the XL machines will be stiff competition for the Commodore 64.

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ATARI 600XL

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Atari 600XL	$399
1010 program recorder	$159
1020 colour printer	$399
1027 letter quality printer	$529
1050 127k disk drive	$NA

Technical specifications

Price	$399
Processor	6502C 1.8 MHz
RAM	16k-64k
ROM	24k
Text screen	16 formats up to 40x24, 16 colours, 16 brightness levels
Graphics	16 formats up to 320x192, 16 shades, 16 brightness levels, player/missile graphics
Keyboard	62 keys, five special function keys
Storage	Dedicated cassette recorder ($159 extra) Built in cartridge socket Optional disk system, up to 4 88k or 127k drives
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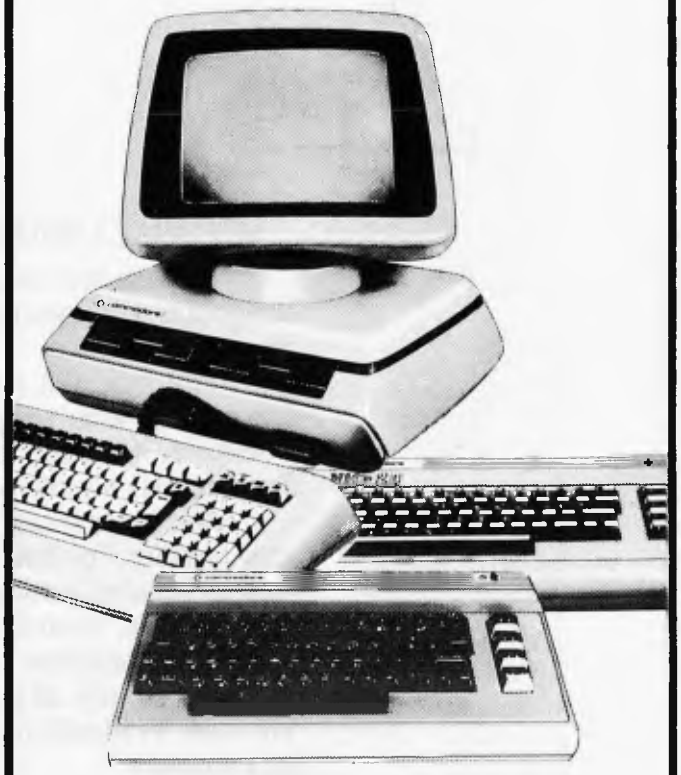

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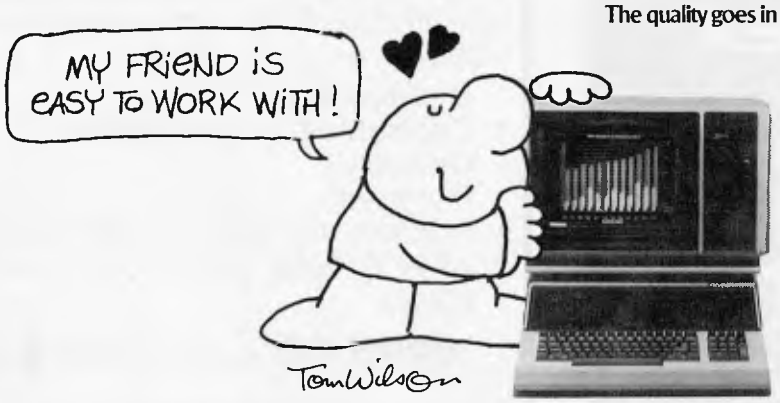

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A BEGINNER'S GUIDE TO PROGRAM CONVERSION
PART 2: SIMULATING STATEMENTS

Last month Surya looked at the factors to consider when choosing between a program conversion and a complete rewrite. Here he assumes that a conversion is appropriate and analyses the procedure in detail.

The initial steps to be taken when converting a program from one dialect of Basic to another are much the same as when coding from scratch and just as much discipline is required. The starting point in either case is to have a clear understanding of what you're setting out to achieve. Make sure you can follow the logic of the program before you attempt to modify it. Spend a little time working out why the author has done things in that particular way. All this may seem unnecessary at first, but it's time well spent: the greater your understanding of the program, the easier the conversion will be.

Once you're satisfied that you have a clear overview of the program as a whole, you can look at each section in detail. Break the program down into its component subroutines. This is only possible with a reasonably structured program, but as mentioned last month, programs with poor or non-existent structuring are best left alone.

When examining each routine, take a special look at the variables. Determine which are global and which are local. Global variables are those used throughout the program. Typical global variables include scores in games, some counters, printer-settings and so on. Local variables are those whose values are used only within a given subroutine: once the routine has been exited, the values are no longer required and the variables may be used for a different purpose within another routine. Typical local variables are counters in FOR-NEXT loops and flags used to check validity of data.

The reason you need to distinguish between the two is that local variables may be freely changed or discarded as appropriate, but global variables need to be treated with a great deal of care — the program as a whole is dependent upon them. If you're lucky, the programmer will have gone to the trouble of listing all global variables in remarks at the beginning of the program, and used fixed local variables so that, for example, w is always a FOR-NEXT loop counter. Failing that, there are utility programs available that will locate variables for you.

Coding

(Note: in the examples given below, I am using A$ to represent any string variable and 100 onwards whenever line numbers are required. These choices are purely arbitrary and have no significance.)

During the process of converting a program from one machine to another, you will very often come across a keyword in the original program for which your machine has no equivalent. While experienced programmers will soon find a way round the problem, those a little newer to the game may find themselves stuck for a solution. What I have done below is to look at some of the common offending statements and methods of achieving the same effect using standard Microsoft. The keywords covered are not in any particular order.

INKEY$: This statement is an almost statutory presence in just about every Basic program ever written. This statement tells the computer to scan the keyboard to test for a key depression and place the result into a specified variable. The standard format is A$=INKEY$; the most common variations are A$=GET$ GET$=A$ and GET A$.

The statement takes one of two forms. On most machines, the processor will carry out a single sweep of the keyboard: if a key is pressed during this scan, the value of the key pressed will be placed into the variable A$. If no key is pressed, A$ will be null (empty). On some machines, however, the computer will carry out a continual series of sweeps until a key-press is detected. A few machines offer both forms.

A continuous scan using the former version of INKEY$ is straightforward: 100 A$=INKEY$:IF A$="" THEN GOTO100. The BBC, however, goes a step further in offering a timed keyboard scan in the form A$=INKEY$(time), where time is given in 100ths of a second. To simulate this using the standard INKEY$ statement, we use a FOR-NEXT loop thus: 100 FOR A=0 TO (value):A$=INKEY$:NEXT. The value of the variable will need to be adjusted to suit. Since different machines have different processing speeds, you'll have to experiment with different values to establish some kind of relationship between the value of the FOR-NEXT counter and real time.

Of course, the example given above would return the final key pressed if there were two or more key depressions during the scan period, but this is easily overcome:

```
100 FLAG=0:A$=""
110 FOR A=0 TO (value)
120 B$=INKEY$:IF NOT B$="" AND
    FLAG=0 THEN A$=B$:FLAG=1
130 NEXT
```

The value of the first key depression is now stored in A$. If no key was pressed, then A$ will be empty.

INSTR: This statement is used to search one string to find out whether it contains a second string. The format is INSTR(main string, sub-string) where the starting position of the sub-string is returned on a successful match and 0 is returned if the search fails. INSTR("APC","P") would return 2 while INSTR("APC","X") would return 0.

We might, for example, want to find out whether NAME$ contains the sub-string 'Rev.'. Using INSTR, we would do this like so:

```
100 IF NOT(INSTR(NAME$,"Rev.")
    =0) THEN PRINT NAME$;" is a
    priest."
```

To simulate this in standard Microsoft, we use MID$. In the above example, we would do so thus:

```
100 FLAG=0:FOR A=1 TO
    (LEN(NAME$)-4
110 IF MID$(NAME$,A,4)="Rev."
    THEN FLAG=1
120 NEXT
130 IF FLAG=1 THEN PRINT
    NAME$"is a priest."
```

Note that on an Atari, line 110 would read as follows:

```
110 IF NAME$(A,4)="Rev." THEN
    FLAG=1
```

and on a Sinclair machine, it would read:

```
110 IF NAME$(A TO A+4)="Rev."
    THEN FLAG=1
```

These differences are due to the non-standard forms of MID$ supported by these machines. The original example should work on all other dialects of Basic.

PROCEDURES AND FUNCTIONS: User-definable functions are supported in varying degrees of sophistication by a number of machines. Procedures and functions make programs infinitely neater and more readable, but they don't actually achieve anything which cannot be duplicated using ordinary sub-routines.

Some dialects of Basic will allow you to GOTO or GOSUB a variable which greatly aids readability — the Basic Converter Chart will tell you which machines do if you look under GOTO.

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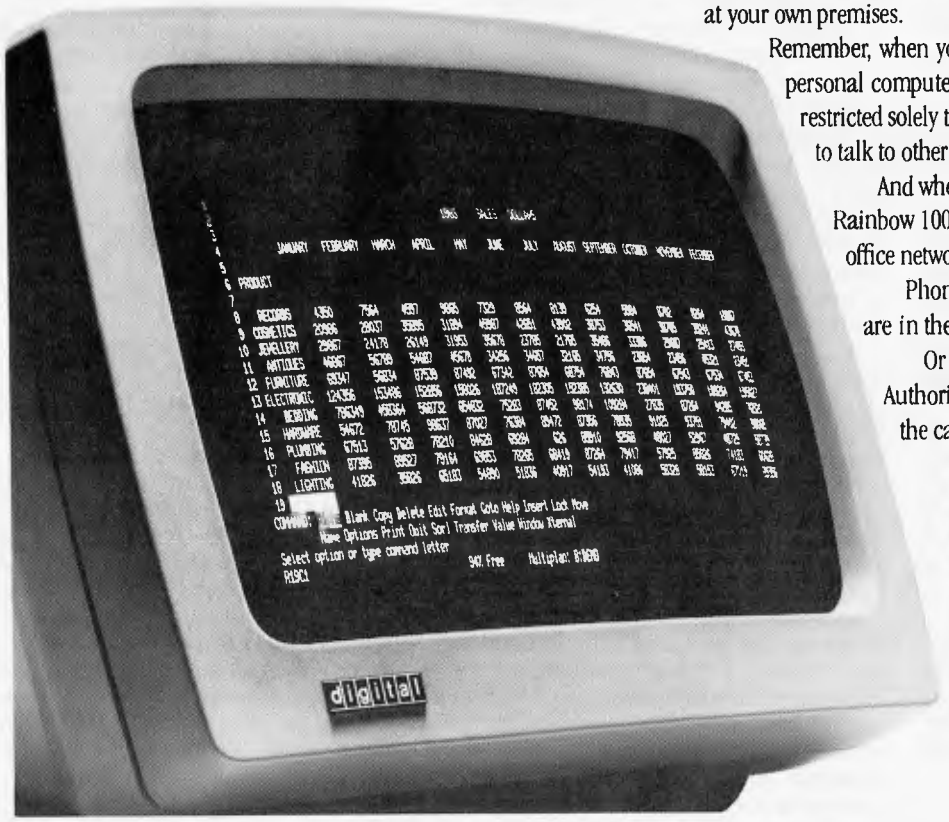

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A BEGINNER'S GUIDE TO PROGRAM CONVERSION

REPEAT-UNTIL and WHILE-WEND. These are two forms of the same control loop, one being the logical reverse of the other. WHILE-WEND checks that a given expression is true and then executes all statements up to the first WEND statement encountered. The computer then returns to the original condition to check whether it is still true. If the condition is false, the statement following the WEND statement is executed.

For example:

```
100 REM — Silly example
110 X=10
120 WHILE X>0
130 PRINT "The current value of X =";X;"."
140 X=X-1:WEND
150 REM - X is now zero and the WHILE test fails
```

In a WHILE-WEND loop, the loop is repeated while the test expression is true. A REPEAT-UNTIL loop works the other way around. All statements between REPEAT and UNTIL are executed until the test expression is true. Thus the above example would be written:

```
100 REM — Same silly example
110 X=10
120 REPEAT
130 PRINT "The current value of X =";X;"."
140 X=X-1:UNTIL X=0
150 REM - X is now zero and the REPEAT test is satisfied
```

Converting from one structure to the other is thus straightforward. But the majority of present-day Basics offer neither of the above. To create the same effect, we have to use a statement that causes purists to gasp in horror and head straight for the reassurance of their micro: the GOTO.

Thus:

```
100 REM — Here we go again
110 X=10
120 PRINT "The current value of X =";X;"."
130 IF X>0 THEN X=X-1:GOTO120
140 REM - X is now zero and the test fails
```

While somewhat less elegant, the net result is the same. We can see that rewriting a WHILE-WEND or REPEAT-UNTIL structure is simply a matter of manually inserting the test (using IF-THEN) and pointer (GOTO).

**STRING$** is a statement which allows you to repeat a given sequence of characters. The format is STRING$(number of times to print string,string). If you wanted to print a line of asterisks across an 80-column screen, for example, you would state: STRING$(80,"*"). If your machine doesn't support this statement, then we fall back once again on the ever ready FOR-NEXT loop. Thus: FOR A=1 TO 80:PRINT"*";:NEXT, the string is simply duplicated, and the numeric argument placed in the FOR-NEXT loop.

TAB. This is supported by most machines.

Next month: Graphics and sound

END

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CONDOR DATABASE

Chris Bidmead looks at Condor, a new package designed to put a mainframe in your micro.

Condor Series 20 is an ambitious package that seeks to put onto a micro some of the mainframe's power to create and manipulate a 'relational database'.

The idea of the relational database began with IBM *(see box: Why Relational?)*, and the general outlines of Condor were developed during the late 70s as mainframe software at the University of Michigan. The system itself first appeared in this country as a cut-down version for 8-bit micros and has now come full circle to Big Blue by being transported across to the IBM PC, where it runs under MS DOS.

Features

The strength of Condor lies in the clarity of its logic, which allows computer users to create and query their own structured database system without having to be expert programmers. The database can be sorted, compared, merged, and calculated using Condor's own English-like language interactively. More complex manipulations may be carried out by combining a sequence of pre-written instructions into a command file that can be stored on disk and used again and again.

Unlike some other database management systems, files are handled in Condor with no reference to physical record locations. This frees the program and the user from the tyranny of sequentiality, in terms of logic at least — which is certainly very much in the spirit of the relational idea.

Presentation

The software was supplied on two 5¼in floppy disks for the review machine, the IBM XT. The same software will also run on the dual floppy version of PC, and other versions are available for CP/M-80.

Instead of the familiar dwarf-format, neatly cased manual that IBM and many of the independent application houses have accustomed us to, the disks are accompanied by about 200 pages in a blue A4 loose-leaf binder.

Getting started

Getting started with Condor is initially a matter of spending half an hour checking through a supplement of closely detailed amendments to the manual and adding new pages. Even when updated the documentation has some surprising departures from the software. Most obvious are the constant references to CP/M — no-one, it seems, has taken the trouble to revise it for DOS. The IBM user

CONDOR SERIES 20 COMMANDS

Database creation and maintenance	
DEFINE	Create a new database, redefine a database, describe a database
DESTROY	Eliminate a database or file
FORMAT	Create or revise a form. Create or revise a HELP screen
REORG	Reorganise the structure of a database, adding or deleting data items
Information input and update	
APPEND	Attach records of one database to another
CHANGE	Change data item values in a database
COMBINE	Attach records of two databases, creating a RESULT database
DELETE	Delete records of a database meeting specified conditions
EMPTY	Eliminate all data in a database
ENTER	Insert new data into a database
POST	Update data item values in one database with those from another
UPDATE	Change data item values in a database meeting specified conditions
Information processing and report writing	
COMPARE	Compare data item values in two databases for (not) matching conditions and create a RESULT database
COMPUTE	Compute data item values on a database
DISPLAY	View selected records of a database
INDEX	Create quick access path by specified data item names
JOIN	Attach data items of two databases by matching data item values
LIST	Produce a video display of records of a database in sequential order
PRINT	Print records of a database in sequential order
PROJECT	Create a RESULT database from selected data items of a database
REPORT	Create, modify or print a report
SELECT	Select database records meeting specified conditions, creating a RESULT database
SORT	Sort database records by data item values
STAX	View or print statistics of data items values
TABULATE	Summarise specified data item values. Print or save the result
TITLE	Print report headings
Operation aids	
HELP	Assist operator in selecting procedures
RESTART	Continue processing of an interrupted command procedure
RUN	Process and execute a command procedure with options for command modification
Interfaces	
READ	Transfer records from an ASCII file to an existing database
WRITE	Transfer records from a database to an ASCII sequential file
Utilities	
COPY	Copy a database or file
DATE	View or enter date
DIC	View entries in the data dictionary
DIR	View the list of files in the disk directory
LOGDISK	Log a new disk in the computer
RENAME	Change the name of a database or file
SAVE	Save a RESULT database
SET	Set operating parameters
SYSTEM	Exit from back to operating system
TERM	Defines system video terminal

unfamiliar with CP/M-80 will be baffled by references to PIP, SYSGEN and SUBMIT.

Once you're reconciled to these and some other minor inconsistencies, the tutorial first half of the manual takes you gently through the process of creating example data files.

You begin to get the flavour of Condor straight away — conversational commands, with often-used sequences of operations automated for convenience. For example, when you start to create a new data file with the command DEFINE, Condor asks you if you want to set up a new form for the file. Answer 'no' to use an existing form file; an affirmative reply leads you directly into the screen-based editor. Here by directly positioning the cursor on the screen you create the form file in which the field names and their display positions are set up.

In some other database managers each data file begins with a header that defines the shape of the records and the kind of data they contain. Condor uses a separate file for this. As well as the form file that decides where the data will appear on the screen, each data file has an associated definition file. So after exiting from the screen editor, DEFINE leads you into the creation of this part of the database by taking you step by step through the business of defining data types.

CONDOR data types comprise alpha-numeric, alpha only, numeric only, dollar *(i.e.* money type) and — one up on dBase II — date. At this stage you also have the chance to build in maximum and minimum limits and set up default values. The whole process is arranged to be interactive, so that you hardly need the manual.

In use

The hub of the system is a file called DATA.DIC, the data dictionary, which keeps track of the relationship between all the format, description and data files you are using.

DATA.DIC is accessible in much the same way as an ordinary Condor database file, which helps a lot to show up the relational logic of the system once you get to know the package well. But the beginner can ignore its existence, thanks to the way DEFINE automatically logs new entries into the data dictionary without involving the user in mechanics.

The simplest task a database performs is to display a particular record or set of records. Most database systems invite the user to define a 'model' which the software then tries to match against all records, masking out the ones that don't fit and finding the ones that do.

In Condor the model is entered into the command line something like this: 'DISPLAY GLEDGER WHERE ACCOUNT = "SMITH01". In this case "SMITH01" is an exact model, but logical relations are also allowed. It's quite legitimate to say, for example: 'DISPLAY DEBTORS WHERE OWING > 450'. In fact, there is a rich vocabulary of synonyms for relational operators, and you can express the same relation as:

GT (greater than)
IS GT
IS NOT LE (is not less than or equal to)

Condor also lets you use ambiguous models. As in the MSDOS command line, a 'wildcard' asterisk means 'and any other trailing characters'. By this token 'DISPLAY GIRLFRENZ WHERE PLACE IS "BAL*" will return details of female companionship in rendezvous as far apart as Balgowlah, Ballan, Ballidu and Ballandean.

In addition to the other fairly standard manipulation commands like SORT, APPEND and COPY, there are several powerful commands that can be used to manipulate multiple data files pseudo-relationally, usually by creating temporary intermediate files.

Compare allows you to make 'matching' or 'not matching' comparisons between individual fields in a pair of data files. Records that meet the criteria are accumulated in a third 'result' file.

Project creates a new data file from the current one containing only certain specified fields. Normally used prior to the JOIN command.

Join produces a result file comprising fields items from two separate data files. JOIN does its best to guess a sensible shape for the new form file in case you want to display it on the screen.

Post updates the values contained in specific fields in data file *A* depending on values found in comparable fields in data file *B*. A simple and direct method of, for example, updating balances to a sales ledger after a payment run.

Condor lets you generate two kinds of report: plain and fancy. Simple reports are created with the PRINT command, with or without a COMPUTE clause to perform maths operations on the data. Any selecting of records required by the report has to be done beforehand.

Level III of Condor, the version under review, also includes a fancy report generator. With this you can lay out the data exactly where you want it on the page and include explanatory text. Because there's a lot of detail to define, the setting-up process is complicated, but Condor gives you some intelligent help.

When you enter the command REPORT followed by a filename you get a screen display something like this:

```
B>>report address
CONDOR SERIES 20 RDBMS
REPORT WRITER
Version 1.01**01
Choose option
Create New Report Specification (C)
Describe existing Report Specification
(D)
Revise existing Report Specification (R)
Print or Display Database Report (P)
Enter option or End <C/R>:
```

The create option takes you back into the screen editor, where you draw up an outline of the report page. This need only be an approximation, as the question-and-answer session that follows takes you through the report line by line, checking it for consistency and letting you approve or amend default values derived from your screen layout.

Only the very experienced design a database correctly first time, but even so users need change, and the time will come when you wish your files were arranged differently.

This is the job of the REORG command, which recalls the screen editor and leads you through the process of reordering, adding or deleting fields. Altering field descriptions is rather more complicated, and involves writing out the file in standard ASCII format and reading it in again.

Verdict

Condor's general strength is that an intelligent non-programmer can quickly create a tailor-made database system complete with help-sheets that can then be used by personnel unversed in the ways of computers. It's also one of the few database management packages to include a data type on which you can do such calculations as 'Days since last invoice = Today's date — Invoice date'.

I particularly like Condor's clear logic, and the extensive use of synonyms so that communication through the command line takes place in quite respectable English.

There are serious shortcomings, however. The IBM PC's big potential market and stable hardware environment offer an enormous opportunity to the software developer to pull an existing product together into a package that works well and has tailored documentation. MicroPro has done it with the old favourite WordStar, but there appears to have been no effort made at all in this direction.

The manual makes no concessions at all to MSDOS — in fact, the documentation is unmodified from the version issued for CP/M. Security in the form of password protection has been promised in Condor for more than a year, but there

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is no sign of it in this new version for the IBM.

Condor has an alarming number of overlay files, virtually one per function. Transporting the software to the 8088/8086 offered the vendors the perfect opportunity to tidy this into one neat package, but they passed it up.

Apart from system variables like $TODAY and those that store the statistics created automatically by COMPUTE there are no variables outside the files themselves. You can often get round this by using JOIN and PROJECT to add and remove file variables in the form of temporary fields, but it's hardly elegant.

Although Condor lets you select particular records and change the contents of fields, it won't let you do both at once. First you have to do a SELECT operation to generate a temporary file consisting only of those records that meet the criteria, then you CHANGE the fields in this temporary file.

dBase II can accomplish this (and more) in one swift move.

Condor's batch processing of commands doesn't really amount to a true run-time enquiry language, because all the conditionals have to be satisifed *before* any files are opened for operations. There's no way it can take different courses of action depending on what it finds in the files.

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The modern relational database is attributed to E F Codd of IBM, but what the phrase means is obscured by the way the work 'relational' crops up in several quite different contexts.

First, 'relational operators' are ways of comparing quantities, the commonest being 'greater than', 'less than' and 'equal to'. These facilities are available to all serious database systems, and have nothing to do with why relational databases are so called.

Database systems often need to bring together items of data stored separately — in different files, perhaps. The Condor manual calls this process 'relating' the files. But although a relational database may need to call on this sort of mechanism more often than others, it's by no means a distinguishing characteristic of the method.

In fact the Condor Series 20 manual adds to the confusion by calling each of its separate data files 'databases'. Correctly speaking, a database is any one body of information, whether it is stored in one file or several. It needn't be in files at all — the data might be in matrices floating about in core memory, or even hard-wired into the electronics, or a combination of these possibilities.

However the data is stored physically, relational theory sees it as being contained in a number of simple tables, like the ones shown in diagram 1. Codd called such tables 'relations', and it is this third meaning that gives the method its name.

Before Codd, it was thought that you couldn't build a database without first knowing the sort of questions that would be put to it. What you stored in databases designed along these lines was never pure data; pointers and linkages had to be laid down in anticipation of the broad shape of the queries to be put. So-called hierarchical and network database systems work this way, and give a fast response to questions of pre-determined form.

But Codd showed that there is a general rule of database design that frees the designer from having to anticipate the questions. By a process he called 'normalising', any body of knowledge can be broken down into elementary relations and stored without linkages, confidently awaiting any sensible questions that may be asked.

An added advantage of the Codd approach is that if the database is extended to include new kinds of data, all that is needed is the creation of new relations. In other systems a major redesign of the whole database is usually required.

The simplicity of the concept imposes a heavy programming overhead when the time comes to get the data out again. In Codd's world the data is stored in the tables with no sequentiality, and entries can be accessed on their contents. Tables can be combined instantly to give new views of the data. Unfortunately, all this is beyond the power of the micro.

Condor is a 'pseudo-relational' database system, substituting indexing or sequential searching for content accessibility, and the creation of temporary files for the true relational join.

But the most important thing that Condor does not do — or for that matter any of the other so-called relational systems on the micro market — is to help you set up the relational tables in the first place. Only if the data is correctly normalised will you get the proper benefits of Codd's approach, and for complex tasks like the generation of cash-flow tables that is by no means a trivial task.

Diagram 1: Simple relations

CUSTOMERS

CODE	NAME	ADDRESS
SMI01	Smith & Co	18 South Road
MAC03	MacKenzie Ltd	112 Gumtree Grove
JAC02	Jacques & Scott	14 Pitt Street

etc

GOODS

STOCK-NO	NAME	PRICE-IN	PRICE-OUT
300101	Electronic Turntable	$120.90	$240.00
777034	ABC Business Micro	$1130.00	$2500.00
001034	Time Crystal	$4.50	$9.95

etc

Relations for customers and goods

Diagram 2: A third relation

ORDERS

CUST-CODE	STOCK-NO	QUANTITY	DATE
MAC03	30001	500	11-JUN-84
JAC02	001034	5	14-JUL-84
SMI01	300101	25	1-MAR-84
SMI01	777034	1	26-FEB-84

etc

Third relation used to relate the customers and goods tables

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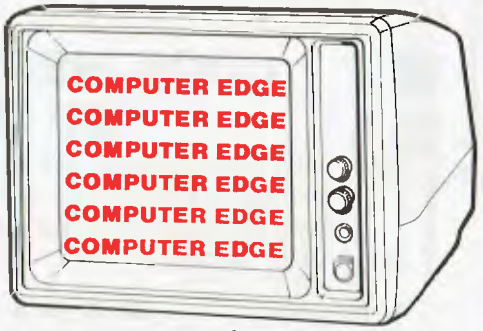

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WHO WANTS TO BE A MILLIONAIRE?

Two men whose lives are dedicated to making dreams come true are Nolan Bushnell and Clive Sinclair. Bushnell made a major impact by inventing the video game and Sinclair by introducing the world's first true pocket calculator. Both men went on to further successes and they have recently both started what can best be described as idea incubators. David Tebbutt takes up the story . . .

America has its Silicon valley and Britain has Cambridge. Both are breeding grounds for high technology companies and are densely populated with very clever electronic engineers, many of them with good product ideas. But what these people often lack is sufficient business know-how to get their products to market. Now two engineer/entrepreneurs, Nolan Bushnell and Clive Sinclair, have come up with answers to this particular problem. In Bushnell's case, he has created a company called Catalyst Technologies which created brand-new high technology companies around original ideas. Sinclair, on the other hand, has created a division of Sinclair Research called Metalab to develop new products around which new operating divisions of Sinclair Research will be constructed. Their ideas appear so similar that I decided to learn more about these pied pipers of the electronic age.

I'll describe each man's history separately up to the point of starting his 'incubator'. After that I'll thread the two tales together. First, Nolan Bushnell . . .

Nolan Bushnell

Bushnell had a fairly conventional schooling, although his father's death when he was 15 must have caused problems at a diffcult age. He went on from school through college and university studying engineering, economics, philosophy, mathematics and business. He first got interested in computers in the mid-sixties when he was still at university. He worked for someone else for the first four years after completing his formal education. In 1971 he raised $500 and started his own spare-time company, Syzygy, which developed a video game called Computer Space. He was employed as an engineer by an arcade game manufacturer and somehow persuaded him to take on the game. It flopped mainly because it was too complicated to learn and too boring once you'd taken the trouble. Bushnell then took on his own engineer to develop a tennis game. His employer refused to touch it and threw Bushnell out. Bushnell tried punting it around but no-one wanted to know. In the end, he christened the product Pong, renamed his company Atari and the rest, as they say, is history.

Pong became a mighty hit in arcades all round the world. Money poured into the Atari coffers at an amazing rate and was squandered almost as quickly on new and unprofitable ventures. Inevitably, Pong lost its appeal and the cash started to dry up. Just in time, another product called Gran Trak came to Atari's rescue and it turned out to be just the first in a sequence of arcade successes. Then the market for domestic video games opened and that was the key to unbelievable growth for the company. Bushnell and his colleagues had created the market for video games yet at this time they controlled only about 10% of it. They desperately needed cash to expand their production capability. Bushnell went to Disney and MCA, both of whom turned him down, but Warner Communciations decided to take the plunge.

In 1976, Warner paid $28,000,000 for Atari, almost half of which went straight into Bushnell's pocket. He stayed on as chairman but suddenly his motivation for 26-hour days had gone. The partnership was not a particularly happy one. Bushnell thought Warner was 'stuffy' and it thought he was irresponsible. Two years later he bought back the rights to one of his ideas, Pizza Time Theatres, from Warner. Warner didn't really think much of the idea anyway and cheerfully dropped the project. There are now over 200 Pizza Time Theatres around the world, each one around nine times more profitable than the average pizza parlour.

The key to this success was Bushnell's recognition that the 20 minutes you have to wait for a pizza to cook could be turned to profit. He installed arcade games, amusement park rides and performing animal robots with names like Chuck E Cheese. The robots entertain while the rides and arcade games absorb the money. Bushnell reckons that there will be 1,000 Pizza Time Theatres around the world by 1986.

Since launching Pizza Time in 1978, he has formed a few more companies. The first, started in 1980, is called Axlon and produces hand-held terminals, memory expansion boards and other bits of microprocessor wizadry. Magnum Microwave Corporation manufactures microwave components for satellite communications companies and Compower Corporation makes switching-power supplies for computers.

In December 1981 he formed his incubator, Catalyst Technologies, which is a holding company for several high-risk, high technology start-up companies. On the side he has also managed to create one of the valley's more pleasant restaurants, the Lion and Compass in Sunnyvale. If you ever find yourself out that way, drop by. It's not bad but, typical of most of Bushnell's activities, you will need to throw quite a few dollars his way.

Clive Sinclair

Clive Sinclair's schooling was a pretty haphazard affair. He somehow managed to attend 13 schools before leaving at the age of 17 to become a technical author. While he was at school he taught himself about electronics and when the time came to go on to university, he discovered no-one taught the sort of electronics courses he felt in need of. The subject at that time was very much a subset of the physics course.

So, a writer he became and he churned out more books in four years than many people manage in a lifetime. Seventeen to

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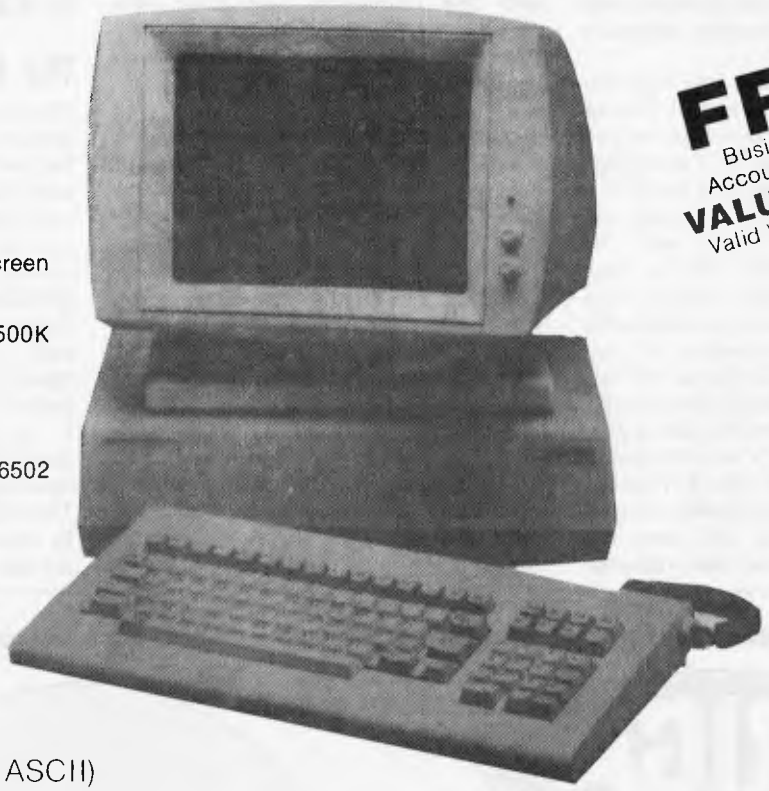

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be precise, plus a large number of articles in *Practical Wireless*. At the age of 22, he was inspired to borrow $80 in order to start his first company, Sinclair Radionics, which sold electronic components by mail order. In the early days of his company, he managed to pick up 1,000 computer transistors which had failed quality control checks. He had realised that they would be perfectly adequate for less demanding work so he wrote a couple of books and an article explaining their uses and promptly sold them at seven times the price originally paid.

His business expanded into hi-fi kits and all seemed to be going well. Within five years the company turnover reached $150,000 and it moved to Cambridge. Five years later it moved to St Ives and it was from this base that Sinclair took the calculator world by storm with the launch of the Executive. Before long Sinclair's turnover was running into millions and he started to invest heavily in research and development of new products. By 1975 the first results of this investment were announced, the cleverly-named Black Watch and his first digital multimeter. A pocket TV was still under development when the Black Watches were found to be unreliable. Nylon carpets were causing all sorts of production problems and then, once the things were on sale, cold weather got at them and they conked out. There was a hell of a storm and ITT, the chip maker, ended up by paying Sinclair $80,000.

The Black Watch fiasco (there was more to it than I've told you) caused such financial strain that Sinclair approached a government body for funding the pocket television. The investment was approved and this partnership continued for almost three years during which time two versions of the Microvision along with five calculators and three new digital multimeters were produced. Behind the scenes, Sinclair was working on a computer project but, before that saga had run its course, things started to get a bit tense between Sinclair and the government. The people who approved the funds left and the new people saw a future in instruments whereas Clive saw a rosy future in consumer electronics. The split was inevitable and soon afterwards the government, claiming the television had cost them about $11,000,000, sold it off to a third party which then found it couldn't make it at a profit.

Clive received a modest 'golden' hand-shake and went to his 'lifebelt' company in the background called Science of Cambridge. It was from the S of C premises that he formed Sinclair Research in July 1979. Seven months later he launched the ZX80 and just over a year after that he introduced the ZX81. Thirteen months later, the Spectrum appeared. Sinclair has also gone into partnership with Cambridge bookshop owner Patrick Browne and formed Sinclair-Browne, a book publishing company. It's no secret that he has an electric car under development which will theoretically see the light of day in 1984. In July 1983 Sinclair announced his incubator, Metalab, which is effectively the R & D arm of Sinclair Research.

The incubators

There's very little difference between the concepts of Metalab and Catalyst Technologies. They both exist to develop new, high-technology, high-risk ideas for later exploitation. In Bushnell's case the participants are set up as separate companies, whereas Sinclair treats Metalab as a division of Sinclair Research. As Bushnell's products hit their stride the company is 'graduated' to stand on its own feet somewhere in the Santa Clara valley, while Sinclair's plan is to make maturing products the foundation of new independent operating divisions of Sinclair Research. The differences are technical ones, really. In each case, the man at the top is the driving force and quite often comes up

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with the original product ideas, too.

As far as the buying public is concerned, both companies are generating things which people will want to buy. They are creating demand for new products which didn't exist before. They are creating jobs for some people and making fortunes in the process. Bushnell and Sinclair are both risk-takers and both currently have the money to be able to take those risks. Could you imagine the public outcry if the government decided to sink tens of millions of dollars into something as off the wall as Pizza Time Theatres? Yet commercially, it has been a resounding success.

It seems to me that Bushnell and Sinclair's motivations differ, Bushnell lives in America, which is extremely success-oriented. Success there tends to relate to the number of noughts on your salary cheque or your personal fortune. I even know some people who are hailed as heroes because their company turnover is so many millions. The fact it makes a loss on those millions doesn't seem to occur to anyone as perhaps being a bit of a failure. One can't blame Bushnell then for saying his aim in life is to create a billion dollar company that will last forever. Sinclair, on the other hand,would seem to be motivated more by seeing his ideas turn into reality. Money is almost a by-product of this activity. It is also the fuel which enables his future ideas to follow the same route.

Bushnell gets things going by rummaging around Silicon Valley for people with bright ideas or those who are capable of implementing such things. He gives them the key to an office on the desk of which are 35 contracts to sign. Once this ceremony is over, a company exists, its staff are insured, they have premises, equipment, telephones, credit — all the things to enable them to get on with the job of creating their product. Catalyst Technologies provides everything else. At Syzygy, Bushnell worked nights being creative because the day was completely filled with simply running a company. He doesn't want other creative people to have to exist like that. His approach, which provides management, secretarial and administrative staff, is reckoned to cut six to nine months off the development time of a project which must be good both for cash flow and for hitting the competition.

Clive Sinclair is getting his staff by advertising. Already he has received several hundred replies from a campaign he ran recently. He is looking for top-notch scientists and engineers who can work under the peculiar pressures induced by high-risk projects. They will be classically trained, unlike Sinclair himself who cheerfully admits that he might not qualify for a job in Metalab. They will be employees of Sinclair Research and, as such, are freed from the worries of having to run a business just as Bushnell's are.

Metalab and Catalyst both rely on peer pressure to motivate their teams to produce results and at the same time they use the community approach to encourage free exchanges of information and ideas between the participants in the various projects. In each case, up to a dozen or so projects can run concurrently in the incubator. Bushnell describd it somewhere as 'a warm, cuddly environment for success'.

I think Bushnell's activities are entirely self-funded whereas Sinclair is not averse to taking the odd 30% government grant when it's offered. Both men place enormous trust in the people they take on. They expect them to respond with a responsible attitude towards work, results and requests for equipment. Both will give their people everything they need to achieve success. This is one area in which publicly funded and large-company funded projects go haywire. Sinclair thinks it odd that people are employed in this country at salaries of, say, $35,000 yet the employer will often balk at spending a couple of hundred dollars on equipment.

Although Sinclair welcomes ideas from outside, his word was 'exogamous', he will not undertake contract research at Metalab. (Incidentally, I had to look that word up, too. It means 'outside marriage' from the Greek words 'Exo' and Gamos'.) At the moment the Sinclair projects are the next computer, the flat-screen television, battery technology and a number of other things which he prefers not to discuss just now. Sooner or later he expects the electric car to move in there too.

Bushnell has among his projects at the moment a robot maker, a computer camp for kids, a video home shopping outfit, a high-resolution television (have you ever seen American TV?) and a games company he bought a couple of years ago. He dreams of holographic games which are played in the space between the machine and its operator. Since his agreement not to compete with Atari expired on 1st October 1983 you can look forward to a lot of excitement soon. The company to watch will be called Sente Technologies. The name was chosen because Atari is the Japanese word for check, whereas, in Go, Sente is the nearest equivalent to checkmate.

Bushnell believes he is motivated by boredom. He feels he always has to have something interesting to work on. I read somewhere that he even regards sleep as a personal insult! Sinclair is driven by the excitement of seeing his ideas become reality.

Both men feel that governments should resist the urge to interfere in business activities. It only has the effect of slowing things down and this applies equally to development of new, or to the demise of existing, activities. They both feel that education needs a bit of a shake-up. Bushnell reckons that kids are being trained to become fundamentally useless in the twenty-first century while Sinclair feels that more emphasis should be placed on the art of living and a broader-based education for all covering both the arts and the sciences. Sinclair is particularly peeved that universities don't fulfil their potential. He describes university departments as being suspended in aspic. Each one pursues its own discipline and there is nowhere near enough intermingling between them. He has a dream of some future time when he can create a 'Paralab' containing multi-disciplinary people, people with deep and varied experiences, people who are keen to explore and develop ideas and pet theories for a few years with others of a similar outlook.

As well as these active people, Sinclair would like to have a group of wise people, savants, who would be there to listen, reflect and generally act as guides and sounding-boards. A well-stocked library would contain a wide and interesting selection of books, including some which would probably be regarded as somewhat eccentric by less open-minded people. His dreams for a Paralab reflect some of his frustrations with the 'system'. His preference for classically-educated employees in his Metalab suggests that they currently offer the best chances of success. The Paralab sounds just about the most exciting environment in which to work. I've no doubt that there will be few places available and that applicants will be vigorously screened. Imagine it: three years free of normal financial pressures, and the ability to pursue your own dreams and studies. If Sinclair is prepared to take that risk, and I'm sure he will, I think it could pay off handsomely.

Neither man seems to be terribly interested in money for its own sake, which is a refreshingly healthy attitude. They both regard it as a tool which must be put to work. Bushnell does admit, however, that it is a convenient way of keeping the score in his favourite game, business. They are each prepared to risk millions on their judgments of what products people will want in the future.

Bushnell talks about the day when you'll be able to jump into a machine in one of his Pizza Time Theatres and actually experience being anywhere in the world. Anywhere, that is, where he has installed remote control robots. A

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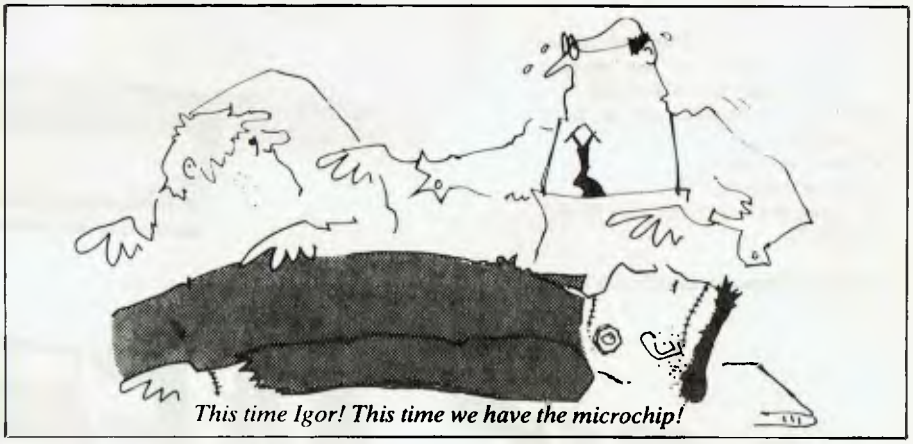
'player' in San Francisco could, through a satellite communication link, order a Canberra-based robot out of its garage and control its progress around our capital. The player could actually experience walking round the High Court or getting lost in a museum. With a bit of holography it might even be possible for the booth to 'become' whatever part of Canberra the robot happens to be in. Can you imagine that? Bushnell can and he's already admitted it.

Sinclair sees a great future in mind-based products. Expert systems can encode the knowledge of professional people on video-disks, say, and export them to any country which needs the expertise. Such systems would be great as personal doctors to take care of all the fairly simple jobs, freeing real doctors to do their jobs properly. Education could be packaged in the same way and we already know what can be done with computer programs. Video tapes, video disks, communications and computers are going to be central in our development and to our prosperity in the coming years. Both men see robots as being important in the future, and Bushnell goes as far as to say things like: 'Robots will provide companionship and therapy for kids who can't make friends!' It may be true but it's an awful thought.

Oddly enough, their stongest dislikes are both to do with people whose ego gives them problems. Bushnell gets really mad when someone makes a mistake, knows it's a mistake and doesn't do anthing about it because of loss of face, pride or whatever you want to call it. If this behaviour gets in the way of the bottom line then he completely freaks out. Sinclair, on the other hand, has a hearty dislike for people who present a facade of what they would like the world to think they are. He loves openness and finds that he can relate to children well because most of them haven't learned to construct a facade. He is sad that his fame has meant a considerable loss of privacy.

And finally . . .

So there we have it. Each man deserves a full biography and I've no doubt that one day two people will become extremely wealthy simply by recording the lives of these two children of the twentieth century. In their different ways each is making a profound impact on our lives. Which is the most beneficial, only time will reveal.



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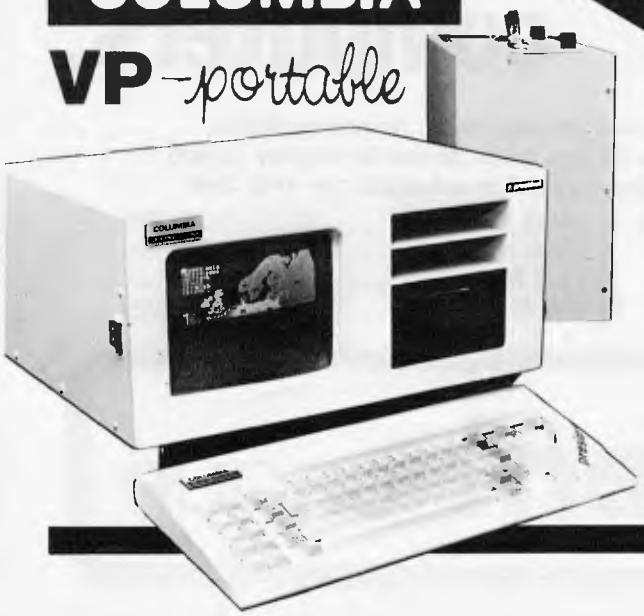

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SETTING THE STANDARD

Atari removes the mystique

Computer "learning centres" in the arcade tradition: David Tebbutt feels that Atari's new approach to user training could be open to adaptation.

Atari has just opened a couple of 'learning centres' in a six month experiment to see if they become profitable. If successful the company plans to open hundreds all over the world. The centres resemble normal retail stores, except the only thing they sell is *computer training.*

They are staffed by people whose primary skill is teaching rather than anything to do with computers. This idea has much to commend it and I've got a feeling that we could all be staring a massive opportunity in the face. Thankfully, you don't need the megabucks of Warner Communications to be able to set up your own. It's an opportunity for anyone prepared to do a conscientious job, even with limited capital. Atari's approach would seem to lend itself well to adaptation and, since I'm already deeply involved in one business, I offer my initial thoughts on the subject freely to anyone who cares to have a go.

Looking at this little bit of history, we find that the most popular type of arcade game for a long time was the one which offered you a chance to make your money grow. The fruit machine is the most widespread and popular of this type of game: the odds are stacked against the player, but the machines occasionally cough up large sums of money. Imagine the joy of the arcade machine owners and operators when video games came along. Here were machines that simply took money, never having to give it back. At the same time, games such as Pac-Man and Space Invaders were just as addictive as the fruit machines. A player's skill is rewarded with 'free' goes and extended play but since there aren't too many really good players around, this only made the tiniest dent in a very profitable activity.

Then came personal computers and home video consoles. Suddenly people could play these games at home. Why pay a fortune in an arcade when you could refine your skills at 'Galaxians' in the comfort of your own living room? Apart from the costs of electricity and of the computer amortised over a couple of years, you are probably well in pocket compared with what you might have spent in the arcades. This must have sent some cold shivers down the spines of people who derived their living from the arcade business. Atari was hit twice more because its personal computer division wasn't as successful as it ought to have been. At the same time as the bottom dropped out of the video console business, computers fell in price and gained in facilities.

Atari needs to revive its fortunes by finding more arcade hits, by starting to shift its computers and software or by starting a new business. Three-dimensional

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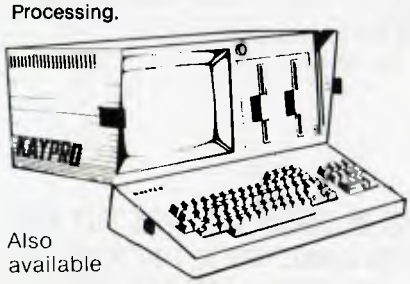

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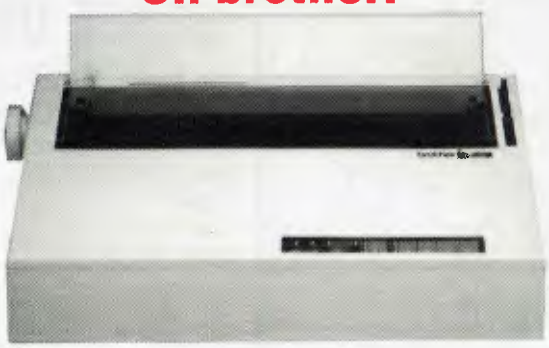

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arcade games spring to mind as one possibility. The important thing is to use advanced technology which isn't available on home computers. The computer side needs a shot in the arm or Atari somehow needs to cash in on the threat posed by the other manufacturers.

The learning centres would seem to be a very smart way of getting out of trouble. They are in the arcade tradition in that they are rooms which people enter, leave money behind and leave with nothing physical except for some changes in the molecular arrangements of the brain. They take advantage of the boom in personal computing by offering to remove the mystique and fear felt by so many people. They also offer the company a new marketing platform for its own range of products, which could lead to a healthy upturn in sales.

Assuming that you decide to open a learning centre, it could differ from the Atari model in a number of ways. For example, you could try to make the centre as automatic as possible by using the computers themselves to teach the punters. Each machine could have a coin box at the side, rather like a parking meter, so that the user can easily see how much time is left and, no doubt, feed it with the forthcoming $1 coins. (Atari is currently charging $7.50 an hour for using the centre.) A few hard disks in a back room could hold all the programs and temporary user files, and a couple of assistants could be on hand when people get stuck or things go wrong. The users could have access to educational programs and demonstrations as well as real programs for people who are qualified in some way to call them up.

Perhaps there could be some sort of 'graduation' process which rewards users with a personal password sequence or something. It could be even more subtle than that. How about the computer 'fingerprinting' qualified people so that it recognises them by their typing style? Once people find hardware or software they fancy perhaps they could buy it on the premises. In large towns, the prices would need to be within a few dollars of the local discount houses. Elsewhere, where competition is less fierce, you could charge normal prices without too much trouble.

It seems to me that this could become quite an industry, certainly for the next few years while people are still at sixes and sevens with computers. It also has the great merit of appearing socially more worthy than running an amusement arcade.

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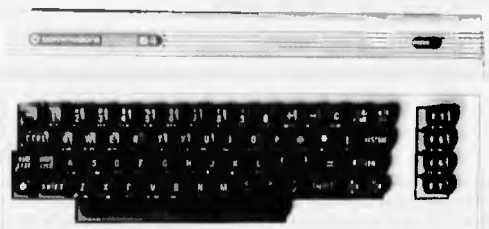

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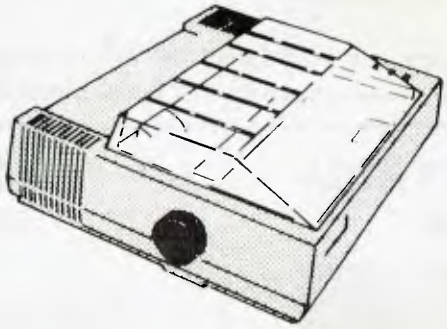

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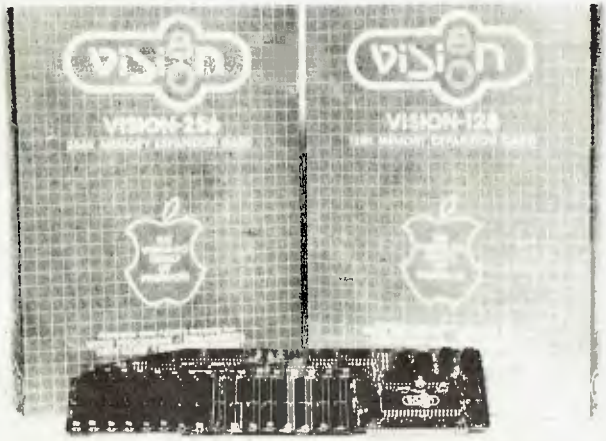

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BASIC CONVERTER CHART

One day, all computers will understand the same language (and read each others' disks and address the screen in the same way and . . .). To tide you through until this great day arrives, however, we set out to beg, steal or even buy eleven of the most popular home micros to produce this APC Basic Converter Chart.

Whether you're trying to convert that amazing Atari game to run on your Apple, have just spent the past three hours wondering why your new Commodore 64 micro doesn't seem to give the right answer to a FRE statement or simply want to write programs which can be easily converted to other micros, the APC Basic Converter Chart is here to help.

It isn't possible, of course, to cover every micro nor every command supported by each of the machines included — much as we'd like to. Also, since different micros have an annoying tendency to use the same keyword to perform slightly — or totally — different functions, converting from one machine to another will require some rewiting beyond simply changing the syntax. What this chart aims to do, however, is provide you with an at-a-glance syntax comparison using Microsoft Basic as the standard. The chart won't convert programs for you, but it should save you the trouble of wading through masses of manuals written by authors who have apparently not yet heard about alphabetical indexing.

Due to the limited amount of information we can squeeze into each box, it hasn't always been possible to indicate the full power of every command or statement. Most LIST statements, for example, allow you to list the whole program, list a specified line, list all lines within a given range, list all lines up to a specified line or list from a specified line. Fiddling around with brackets in an attempt to represent each of these possibilities would lead to a totally incomprehensible entry. It should be assumed, therefore, that we're dealing with the most common use of each statement here and that other uses may be available.

Something to be aware of is that identical syntax may have very different effects on different machines. SYSTEM on a TRS-80 will transfer program control to a machine language routine while in Microsoft Basic closes files prior to returning to the operating system.

You will notice that we haven't included anything on sound and graphics; with most of today's micros offering both high-resolution graphics and fairly sophisticated sound control, this area would require a chart of its own. APC will be looking at sound and colour in a later issue.

The abbreviations used in the chart are as follows:

addr = address, exp = expression,
sub = subscript, stmt = statement,
var = variable,
Square bracket [ ] indicates optional code.

BASIC RESERVED WO

STANDARD MICROSOFT / MACHINE	ABS Gives absalute value of expression.	ASC Returns ASCII value of first character of string.	ATN Arctangent of expression.	AUTO	CALL Calls assembler language sub-routine.	CHAIN Call a new program & pass variables to it.	CHR$ Gives ane-char-string with ASCII coda af exp.	CLEAR Claar selected vaarieblas.	CLOSE Clases disk filas —closes all files if na specification.	CONT Cantinue program executian.	COS Cosine af expression.
MICROSOFT	ABS(axp)	ASC(string)	ATN(exp)	AUTO [linena, val]	CALL var[(ver. var . . .)]	CHAIN "filename"	CHRS(exp)	CLEAR[exp. exp]		CONT	COS(exp)
APPLESOFT	ABS(axp)	ASC(string)	ATN(exp)		CALL addr	CHAIN "filenama"	CHRS(exp)	CLEAR	CLOSE "filaname"	CONT	COS(exp)
ATARI	ABS(exp)	ASC(string)	ATN(exp)			RUN"C:" NB: program must have been saved using SAVE "C"	CHRS	CLR	CLOSE [#fileno. fileno . . .]	CONT	COS(exp)
BBC MICRO	ABS(exp)	ASC(string)	ATN(exp)	AUTO [lineno. val]	CALL addr [.var, var . . .]	CHAIN "filename"	CHRS(exp)	CLEAR	CLOSE #filena Note:CLOSE #0 to clase all files		COS(exp)
COMMODORE 64	ABS(exp)	ASC(string)	ATN(exp)		SYS(addr)		CHRS(exp)	CLR(exp)	CLOSE fileno	CONT	COS(exp)
MICROBEE	ABS(real-axp)	ASC(string)	ATAN(real-exp)	AUTO (linena. val]			CHR(integer-exp)	STRS(int-exp) Nate: set limits for string mamory		CONT	COS(reel-exp)
PET	ABS(exp)	ASC(string)	ATN(exp)		SYS(addr)		CHRS(exp)	CLR	CLOSE filena	CONT	COS(exp)
TRS-80/SYSTEM 80	ABS(exp)	ASC(string)	ATN(exp)	AUTO [lineno. val]			CHRS(exp)	CLEAR(exp) Note: Clears string space if axp given	[dapends on OS: consult OS manual]	CONT	COS(exp)
VIC-20	ABS(exp)	ASC(string)	ATN(exp)		SYS addr		CHRS(exp)	CLR	CLOSE #filena	CONT	COS(exp)
VZ200	ABS(axp)	ASC(string)	ATN(exp)				CHRS(exp)	CLEAR[exp] N clears string space		CONT	COS(exp)
ZX81	ABS(exp)	CODE(string) Note: ZX81 does not use ASCII code	ATN(exp)		LET var = USR (addr) Nate: equivalent statement		CHRS(exp) Nate: ZX81 does not use ASCII code	CLEAR	N/A — ZX81 does not support file-handling	CONT	COS(exp)
ZX SPECTRUM	ABS(exp)	CODE(string)	ATN(exp)		LET var = USR (addr) Note: roughly equivalent		CHRS(exp)	CLEAR	Consult Microdrive manual	CONTINUE	COS(exp)

RDS & FORMATS

DATA	DEF	DELETE	DIM	EDIT	END	EXP	FOR	FRE	GET	GOSUB	GOTO	IF/THEN/ELSE
Lists data to be used in a READ statamant.	Define arithmetic string function.	Delete specified program lines.	Allocates space for arrays. specifies max subscript values.	Edit a program line.	Stop program & return to BASIC.	Raises to power of expression.	Used with NEXT to repeat a sequence of lines.	Returns remaining memory space.	Read a record from disk or tape	Branch to a Basic subroutine.	Branch to a specified line number.	If exp is true stmt is executed. If not ELSE or following line is executed.
DATA censt [,canst . . .]	DEF FNvar [(var,var . . .)] =exp	DELETE lineno [,lineno]	DIM var(sub), [,var(sub), . . .]	EDIT linana	END	EXP(exp)	FOR var = exp TO exp [STEP axp]	FRE(exp)	file. GET [#] file-no [,record na]	GOSUB linana	GOTO lineno	IF exp THEN stmt [ELSE stmt]
DATA CONST [,canst . . .]	DEF FNvar (var) = exp	OEL linane, linane	OIM var(sub) [,ver(sub) . . .]	[screen editing using CTRL keys]	END	EXP(axp)	FOR var = exp TO exp	FRE(exp)Nate: exp is a dummy variable	INPUT var [,var . . .] NB: Get var(s) from current input device	GOSUB linena/ var/exp	GOTO linena	If exp THEN stmt Nete: no ELSE
DATA canst [,const . . .]			DIM [or COM] var (sub) [,var (sub) . . .] NB:dim'sion ALL strings	[curser editing]	END	EXP(exp)	FOR var = exp TO exp [STEP axp]	FRE(exp) Note: exp is a dummy variable	GET # filano, record	GOSUB linena/ var/exp	GOTO linano/ var/exp	If axp THEN stmt Nete: na ELSE
DATA canst [,canst . . .]	DEF FNvar [(var. var)] = exp	OELETE lineno. linena	DIM Var(sub) [,var(sub) . . .]	[cursar editing]	ENO	EXP(axp)	FOR var = axp TO exp [STEP exp]	HIMEM-TOP	INPUT # fileno. record [,record . . .]	GOSUB linena/ var/exp	GOTO linano/ var/exp	IF exp THEN stmt [ELSE stmt]
DATA const [,canst . . .]	DEF FNvar =exp		OIM var(sub) [,var(sub) . . .]	[cursar editing]	END	EXP(exp)	FOR var = exp TO exp [STEP exp]	FRE(axp) Note: exp is a dummy varieble	GET #filena, record [,record . . .]	GOSUB lineno	GOTO lineno	IF exp THEN stmt Note: ne ELSE
DATA expr (,exp ("exp"))	FNn = exp	OELETE lineno. (lineno.)	DIM var(sub) (,ver(sub))	EOIT (linene.)	END	EXP (reel=exp)	FOR var=exp TO exp (STEP exp)	FRE(0) mem. space FRE($) str. space		GOSUB NB: sq. br. significant	GOTO lineno	IF exp THEN stmt (ELSE stmt)
DATA canst [,const . . .]	DEF FNvar (ver) = exp)		DIM var(sub) [,var(sub) . . .]	[cursar editing]	END	EXP(exp)	FOR var = exp TO exp [STEP exp]	FRE(exp) [TRS-80] is a dummy variable	INPUT # fileno. record [,record . . .]	GOSUB linene	GOTO lineno	IF exp THEN stmt Nota: no ELSE
DATA canst [,canst]	Various OEF statements available but none equivalent	DELETE lineno-linene	DIM var(sub) [,var(sub) . . .]	EOIT linene	ENO	EXP(exp)	FOR var = exp TO exp [STEP exp]	FRE(exp) [TRS-80] or MEM [System 80]	INPUT # fileno. record [,record . . .]	GOSUB lineno	GOTO lineno	IF exp THEN stmt [ELSE stmt]
DATA const [,const . . .]	DEF FN(var) -axp		DIM var(sub) [,var(sub) . . .]	[cursar editing]	END	EXP(exp)	FOR var = exp TO exp [STEP exp]	FRE(exp) Nota: exp is a dummy veriable	GET # filane, record	GOSUB lineno	GOTO linena	IF exp THEN stmt Nate: no ELSE
DATA canst [,canst . . .]			DIM var(sub) [,var(sub) . . .]		END	EXP(exp)	FOR var=exp TO exp [STEP exp]		INPUT # file-name var[,ver . . .] NB: Gets record from tape	GOSUB linene	GOTO LINENO	IF exp THEN stmt lineno [ELSE stmt /lineno
			DIM var(sub)	EOIT Note: use cursor to select line		EXP(exp)	FOR var = exp TO exp [STEP exp]			GOSUB LINENO var/exp	GOTO LINENO var/exp	IF exp THEN stme Nete: ne ELSE
DATA canst [,canst . . .]	DEF FNvar [(var. var . . .)] = exp		DIM var(sub)	EOIT (linena) Note: cursar line by dofault		EXP(exp)	FOR var = exp TO exp [STEP exp]		Consult Microdriva manual	GOSUB linana/ var/exp	GOTO linano/ var/exp	IF exp THEN stmt Note: no ELSE

BASIC RESERVED WO

STANDARD MICROSOFT / MACHINE	INKEY$ Returns character typed at keyboard or null if no character typed.	INPUT Read data from terminal.	INT Evaluates expression for largest integer contained.	LEFT$ Returns specified no. of characters starting at beginning of string.	LEN Gives decimal length of string.	LET Gives a value to a variable.	LIST List specified program lines at terminal.	LLIST List specified program lines at printer.	LOAD Load a program file into memory.	LOG Natural logarithm of expression.	MID$ Gives specified of characters to the right of start position in string.
	INKEY$	INPUT [STRING;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN (string)	[LET] var=exp	list [lineno, lineno]	LLIST [lineno, lineno]	LOAD ["filename"]	LOG(exp)	MID$(string, [,length])
APPLESOFT	GET VAR	INPUT[STRING,] VAR [,VAR . . .]	INT(exp)	LEFT$ (string) LENGTH)	LEN(string)	[LET] var = exp	LIST [Lineno, lineno] Note: '—' may be used in place of ','	[depends on interface arrangemant—usually LIST"P]	LOAD FILENAME	LOG(exp)	MID$(string, start[,length])
ATARI		INPUT [exp] var [,var . . .] or INPUT [exp] string-var	INT(exp)	string (start, length)	LEN(string)	[LET] var=exp	LIST [lineno, linene]	LIST "P"	CLOAD ["file-name"][cass] or LOAD "fileno:file-name" [disk]	LOG(exp)	string(start [,length])
BBC MICRO	GET var [unlimited time] or INKEY (time) Note: 100ths sec.	INPUT [string [,]] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var=exp	LIST [lineno-lineno]	CTRL-B then LIST [lineno-lineno]	LOAD "filename" Note: '*DISK' or '*TAPE' to select device	LN(exp) NB: LOG(exp) gives common rather than natural log	MID$(string, start[,length])
COMMODORE 64	GET var	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var = exp	LIST [lineno-lineno]	OPEN 4,4: CMD4: LIST [lineno-lineno]	LOAD ["file-name"] [cass] or LOAD "filename" 8 [disk]	LOG(exp)	MID$(string, start[,length])
MICROBEE	KEY	INPUT (string) var (,var)	INT(real-exp)	var(;1, length)	LEN(string)	(LET) var=exp LET obligatory after THEN and ELSE	LIST (lineno. (,lineno)) forceloads	LLIST (lineno. (,lineno))	LOAD (U) (?) ("filename") LOAD U	LOG(real - exp)	var(;n,n+m-1) -n-start character, m-length
PET	GET var	INPUT [STRING, var [,var . . .]	INT(exp)	LEFT$ (string, length)	LEN(string)	[LET] var = exp	LIST [Lineno-linene]	OPEN 4,4: CMD4: LIST [lineno-lineno]	LOAD["file-name"] [cass] or LOAD "filename", 8 [disk]	LOG(exp)	MID$(string, start[,length])
TRS-80/SYSTEM 80	INKEY$	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN string)	[LET] var = exp	LIST [lineno-lineno]	LLIST [Linane-lineno]	CLOAD "[file-name]" [cass] or LOAD "filename" [disk floppy tape]	LOG(exp)	MID$(string, start,length])
VIC-20	GET var	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var = exp	LIST [lineno-lineno]	OPEN3,4:CMD 3: LIST [linono-lineno]	LOAD ["file-name"][cass] or LOAD "filename", 8 [disk]	LOG(exp)	MID$(string, start[,length])
VZ200	INKEY$	INPUT[string;] var [,var . . .]	INT(exp)	LEFT$ (string, length)	LEN (string)	[LET] var = exp	LIST [lineno-lineno]	LLIST [lineno-lineno]	CLOAD ["file-name"]	LOG (exp)	MID$ (string, start, [,len])
ZX81	INKEY$	INPUT var	INT(exp)	string(TO finish)	LEN(string)	LET var = exp	LIST [lineno]	LLIST [lineno]	LOAD "[filename"]	LN(exp)	string(start TO finish)
ZX SPECTRUM	INKEY$	INPUT [string;] var	INT(exp)	string (TO finish)	LEN(string)	LET var = exp	LIST [lineno] Note: will fill screen then ask SCROLL?	LLIST [lineno]	LOAD "filename" [cass] Note: Microdrive manual for disk	LN(exp)	string(start TO finish)

RDS & FORMATS

NAME Rename a file.	NEW Delete current program & data from memory.	NEXT End of FOR/NEXT loop.	ON ERROR Error trap subroutine.	ON/GOSUB GOTO lineno specified by evaluation of expression.	ON/GOTO GOTO lineno specified by evaluation of expression.	OPEN Open disk file.	OUT Put specified byte to specified output port.	PEEK Read byte from specified memory location.	POKE Put specified byte to specified memory address.	PRINT Write data to disk file.	RANDOMIZE Reset random number generator.	READ Read from data statements into specified variables.
NAME "filename" AS "filename"	NEW	NEXT var [,var . . .]	ON ERROR GOTO linene	On exp GOSUB lineno [,linene . . .]	On exp GOTO lineno [,lineno . . .]	OPEN mode [#] fileno "filename"	OUT port,byte	PEEK (addr)	POKE addr,byte	PRINT [[#] fileno][exp] [,exp . . .]	RANDOMIZE [exp]	READ var [,var . . .]
RENAME oldname, newname	NEW	NEXT [var, var . . .]	ONERR GOTO lineno	On exp GOSUB lineno [,linene . . .]	On exp GOTO lineno [,lineno . . .]	OPEN filename		PEEK(addr)	POKE addr,byte	PRINT exp [,exp . . .] NB: prints to current output device		READ var [,var . . .]
	NEW	NEXT var	TRAP lineno/ ver/exp	ON exp GOSUB lineno [,lineno . . .]	ON EXP GOTO lineno [,lineno . . .]	OPEN #fileno, mode control code, filename	[not equivalent]	PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .]	RND(-exp)	READ var [,var . . .]
	NEW Note: under cert. circum. may be recovered using OLD	NEXT [var, var . . .]	ON ERROR stmt	ON exp/var GOSUB lineno [,lineno . . .]	ON exp/var GOSUB lineno [,linene . . .]	fileno-OPENIN [to read] or fileno-OPENOUT [to write]		?addr NB: '?' does NOT mean 'print' in BBC Basic	?addr,byte	PRINT #filename, record [,record . . .]	RND(-exp)	READ var [,var . . .]
OPEN 1,8,15, "RO: filename-filename"[disk only]	NEW	NEXT [var, var . . .]		ON exp GOSUB linene [,lineno . . .]	ON exp GOTO lineno [,linene . . .]	OPEN # exp, fileno, mode, "filename"		PEEK(addr) BYTE	POKE AOOR,	PRINT #fileno, record [,record . . .]	RND(-TI)	READ ver [,var . . .]
	NEW	NEXT ver NEXT *var lineno. -exits loop before completion	ON ERROR GOTO lineno.	ON exp GOSUB ([exp[,exp]])lineno (,([exp . . .	ON exp GOTO lineno (,lineno.)		OUT port,byte	PEEK(address)	POKE address, byte	PRINT list		READ ((linene.)) var(,var)
RENAME [fileno,] "oldname" TO "newname"	NEW	NEXT [var,var . . .]		ON exp GOSUB lineno [,lineno . . .]	ON exp GOTO lineno [,lineno . . .]	OPEN #exp, mode, "filename" fileno, mode		PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .]	RND(-TI]	READ VAR [,var . . .]
[depends on OS; consult OS manual]	NEW	NEXT [var,var . . .]	ON ERROR GOTO lineno	ON exp GOSUB lineno [,lineno . . .]	ON EXP GOTO linene [,lineno . . .]	[depends on OS; consult OS manuel.]	OUT Port,byte	PEEK(addr)	POKE addr,byte	PRINT #-fileno, record [,record . . .] [cass]	RANDOM	READ var [,var . . .]
	NEW	NEXT [var,var . . .]		ON exp GOSUB lineno [,lineno . . .]	ON exp GOTO lineno [,lineno . . .]	OPEN exp,fileno, mode, "filename"		PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .[	RND(-TI)	READ var [,var . . .]
	NEW	NEXT[var]					OUT port,byte	PEEK(addr)	POKE addr,byte	PRINT#"filename" exp[,exp . . .] NB prints to tape		READ var[,var . . .]
	NEW	NEXT var						PEEK(addr)	POKE addr,byte	—	RAND(exp)	
	NEW	NEXTvar				Consult Microdrive manual	OUT post,byte	PEEK(addr)	POKE addr,byte	Consult Microdrive menual	RAND(exp)	READ var [,var . . .]

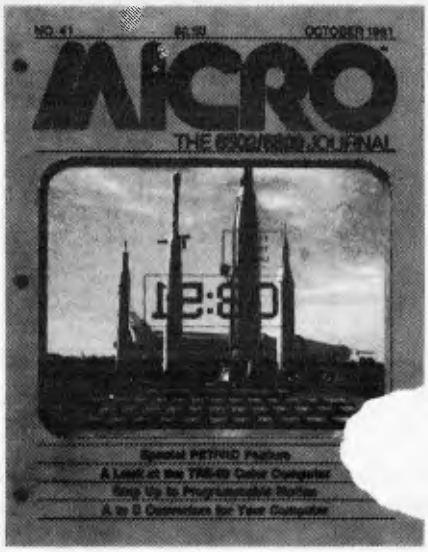
BASIC RESERVED WO

STANDARD MICROSOFT / MACHINE	INKEY$ Returns character typed at keyboard or null if no character typed.	INPUT Read data from terminal.	INT Evaluates expression for largest integer contained.	LEFT$ Returns specified no. of characters starting at beginning of string.	LEN Gives decimal length of string.	LET Gives a value to a variable.	LIST List specified program lines at terminal.	LLIST List specified program lines at printer.	LOAD Load a program file into memory.	LOG Natural logarithm of expression.	MID$ Gives specified of characters to the right of start position in string.
	INKEY$	INPUT [STRING;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN (string)	[LET] var=exp	list [lineno, lineno]	LLIST [lineno, lineno]	LOAD ["filename"]	LOG(exp)	MID$(string, [,length])
APPLESOFT	GET VAR	INPUT[STRING,] VAR [,VAR . . .]	INT(exp)	LEFT$ (string) LENGTH)	LEN(string)	[LET] var = exp	LIST [Lineno, lineno] Note: '—' may be used in place of ','	[depends on interface arrangemant—usually LIST"P]	LOAD FILENAME	LOG(exp)	MID$(string, start[,length])
ATARI		INPUT [exp] var [,var . . .] or INPUT [exp] string-var	INT(exp)	string (start, length)	LEN(string)	[LET] var=exp	LIST [lineno, linene]	LIST "P"	CLOAD ["file-name"][cass] or LOAD "fileno:file-name" [disk]	LOG(exp)	string(start [,length])
BBC MICRO	GET var [unlimited time] or INKEY (time) Note: 100ths sec.	INPUT [string [,]] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var=exp	LIST [lineno-lineno]	CTRL-B then LIST [lineno-lineno]	LOAD "filename" Note: '*DISK' or '*TAPE' to select device	LN(exp) NB: LOG(exp) gives common rather than natural log	MID$(string, start[,length])
COMMODORE 64	GET var	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var = exp	LIST [lineno-lineno]	OPEN 4,4: CMD4: LIST [lineno-lineno]	LOAD ["file-name"] [cass] or LOAD "filename" 8 [disk]	LOG(exp)	MID$(string, start[,length])
MICROBEE	KEY	INPUT (string) var (,var)	INT(real-exp)	var(;1, length)	LEN(string)	(LET) var=exp LET obligatory after THEN and ELSE	LIST (lineno. (,lineno)) forceloads	LLIST (lineno. (,lineno))	LOAD (U) (?) ("filename") LOAD U	LOG(real - exp)	var(;n,n+m-1) -n-start character, m-length
PET	GET var	INPUT [STRING, var [,var . . .]	INT(exp)	LEFT$ (string, length)	LEN(string)	[LET] var = exp	LIST [Lineno-linene]	OPEN 4,4: CMD4: LIST [lineno-lineno]	LOAD["file-name"] [cass] or LOAD "filename", 8 [disk]	LOG(exp)	MID$(string, start[,length])
TRS-80/SYSTEM 80	INKEY$	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN string)	[LET] var = exp	LIST [lineno-lineno]	LLIST [Linane-lineno]	CLOAD "[file-name]" [cass] or LOAD "filename" [disk floppy tape]	LOG(exp)	MID$(string, start,length])
VIC-20	GET var	INPUT [string;] var [,var . . .]	INT(exp)	LEFT$(string, length)	LEN(string)	[LET] var = exp	LIST [lineno-lineno]	OPEN3,4:CMD 3: LIST [linono-lineno]	LOAD ["file-name"][cass] or LOAD "filename", 8 [disk]	LOG(exp)	MID$(string, start[,length])
VZ200	INKEY$	INPUT[string;] var [,var . . .]	INT(exp)	LEFT$ (string, length)	LEN (string)	[LET] var = exp	LIST [lineno-lineno]	LLIST [lineno-lineno]	CLOAD ["file-name"]	LOG (exp)	MID$ (string, start, [,len])
ZX81	INKEY$	INPUT var	INT(exp)	string(TO finish)	LEN(string)	LET var = exp	LIST [lineno]	LLIST [lineno]	LOAD "[filename"]	LN(exp)	string(start TO finish)
ZX SPECTRUM	INKEY$	INPUT [string;] var	INT(exp)	string (TO finish)	LEN(string)	LET var = exp	LIST [lineno] Note: will fill screen then ask SCROLL?	LLIST [lineno]	LOAD "filename" [cass] Note: Microdrive manual for disk	LN(exp)	string(start TO finish)

RDS & FORMATS

NAME Rename a file.	NEW Delete current program & data from memory.	NEXT End of FOR/NEXT loop.	ON ERROR Error trap subroutine.	ON/GOSUB GOTO lineno specified by evaluation of expression.	ON/GOTO GOTO lineno specified by evaluation of expression.	OPEN Open disk file.	OUT Put specified byte to specified output port.	PEEK Read byte from specified memory location.	POKE Put specified byte to specified memory address.	PRINT Write data to disk file.	RANDOMIZE Reset random number generator.	READ Read from data statements into specified variables.
NAME "filename" AS "filename"	NEW	NEXT var [,var . . .]	ON ERROR GOTO linene	On exp GOSUB lineno [,linene . . .]	On exp GOTO lineno [,lineno . . .]	OPEN mode [#] fileno "filename"	OUT port,byte	PEEK (addr)	POKE addr,byte	PRINT [[#] fileno][exp] [,exp . . .]	RANDOMIZE [exp]	READ var [,var . . .]
RENAME oldname, newname	NEW	NEXT [var, var . . .]	ONERR GOTO lineno	On exp GOSUB lineno [,linene . . .]	On exp GOTO lineno [,lineno . . .]	OPEN filename		PEEK(addr)	POKE addr,byte	PRINT exp [,exp . . .] NB: prints to current output device		READ var [,var . . .]
	NEW	NEXT var	TRAP lineno/ ver/exp	ON exp GOSUB lineno [,lineno . . .]	ON EXP GOTO lineno [,lineno . . .]	OPEN #fileno, mode control code, filename	[not equivalent]	PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .]	RND(-exp)	READ var [,var . . .]
	NEW Note: under cert. circum. may be recovered using OLD	NEXT [var, var . . .]	ON ERROR stmt	ON exp/var GOSUB lineno [,lineno . . .]	ON exp/var GOSUB lineno [,linene . . .]	fileno-OPENIN [to read] or fileno-OPENOUT [to write]		?addr NB: '?' does NOT mean 'print' in BBC Basic	?addr,byte	PRINT #filename, record [,record . . .]	RND(-exp)	READ var [,var . . .]
OPEN 1,8,15, "RO: filename-filename"[disk only]	NEW	NEXT [var, var . . .]		ON exp GOSUB linene [,lineno . . .]	ON exp GOTO lineno [,linene . . .]	OPEN # exp, fileno, mode, "filename"		PEEK(addr) BYTE	POKE AOOR,	PRINT #fileno, record [,record . . .]	RND(-TI)	READ ver [,var . . .]
	NEW	NEXT ver NEXT *var lineno. -exits loop before completion	ON ERROR GOTO lineno.	ON exp GOSUB ([exp[,exp]])lineno (,([exp . . .	ON exp GOTO lineno (,lineno.)		OUT port,byte	PEEK(address)	POKE address, byte	PRINT list		READ ((linene.)) var(,var)
RENAME [fileno,] "oldname" TO "newname"	NEW	NEXT [var,var . . .]		ON exp GOSUB lineno [,lineno . . .]	ON exp GOTO lineno [,lineno . . .]	OPEN #exp, mode, "filename" fileno, mode		PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .]	RND(-TI]	READ VAR [,var . . .]
[depends on OS; consult OS manual]	NEW	NEXT [var,var . . .]	ON ERROR GOTO lineno	ON exp GOSUB lineno [,lineno . . .]	ON EXP GOTO linene [,lineno . . .]	[depends on OS; consult OS manuel.]	OUT Port,byte	PEEK(addr)	POKE addr,byte	PRINT #-fileno, record [,record . . .] [cass]	RANDOM	READ var [,var . . .]
	NEW	NEXT [var,var . . .]		ON exp GOSUB lineno [,lineno . . .]	ON exp GOTO lineno [,lineno . . .]	OPEN exp,fileno, mode, "filename"		PEEK(addr)	POKE addr,byte	PRINT #fileno, record [,record . . .[	RND(-TI)	READ var [,var . . .]
	NEW	NEXT[var]					OUT port,byte	PEEK(addr)	POKE addr,byte	PRINT#"filename" exp[,exp . . .] NB prints to tape		READ var[,var . . .]
	NEW	NEXT var						PEEK(addr)	POKE addr,byte	—	RAND(exp)	
	NEW	NEXTvar				Consult Microdrive manual	OUT post,byte	PEEK(addr)	POKE addr,byte	Consult Microdrive menual	RAND(exp)	READ var [,var . . .]

A feast of computing ideas.



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If you work with a 6502 or 6809 based system, you're probably hungry for the facts and ideas that will help you understand the inner workings of your computer. You want to go beyond canned software–use your computer for more than games–learn the advanced programming techniques that enable you to get the most out of your 6502/6809 system.

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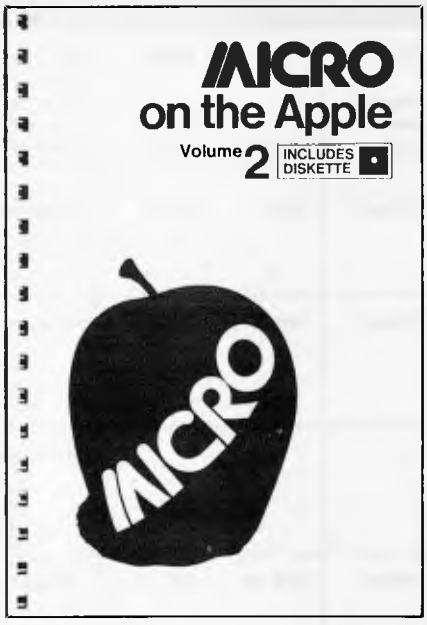

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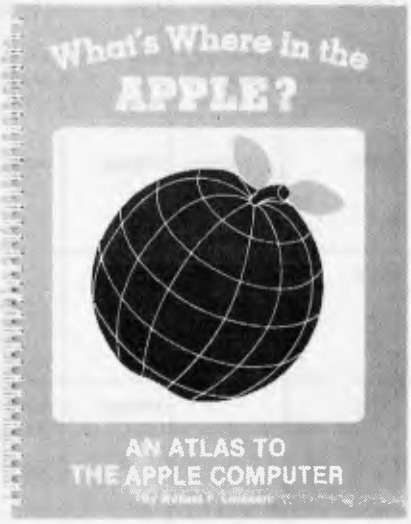

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COSMIC SOFTWARE

VIC 20

NIGHT RIDER Now a challenging motor car driving game is available on cassette. You control your path down the twisting road increasing speed by joystick control. High speed action in this exciting game. How fast can you complete 3 kilometres? **$15.95.**

KONGO**KONG** This game provides hours of jumping barrels and climbing ladders. The object of the game is to climb the ladders to the top in order to reach the maiden in distress. **$19.95.**

ANNIHILATOR In this defender-type game, your aim is to defend your moon base from the attacking aliens who will launch heat seeking missiles to destroy you. If any game on the Vic without memory expansion requirements wins the prize for speed, this is it! **$19.95.**

TREK Commanding the bridge of your starship, you explore the galaxy, fending off the Klingon invasion with your phasers and photon torpedoes. **$16.95.**

STREET SWEEPERS Gobble up the dots in the maze before the ensuing nemesis gets you. The maze is different every time. Does this sound like PacMan? It isn't! **$15.95.**

BUG BLAST If you think Centipede was fun, look out for Bug Blast. Only a few bugs to kill. Just shoot through the cactus and wipe them out. **$19.95.**

SNAKE OUT Slip your snake into position and score by chomping the blocks. Watch the way you slither because your escape routes get smaller. **$17.95.**

CATTLE ROUND-UP With Cattle Round-Up you will have to ride fast and push hard. Move your cowboy through the maze and get the cattle back into the corral. **$16.95.**

MOSQUITOES: Vic 20 Trapped beneath massive stone walls, you must find the key, evade attacking mosquitoes and escape through the locked door. Armed with insect spray, you must avoid destruction by escaping through the mysterious ventilation tunnels. Four very exciting levels packed with action. **$19.95.**

TYPING TUTOR: Vic 20 Improve your typing skills using this simple typing tutor. Includes practice of letters, words, sentences and a keyboard trainer. Colour and sound make learning fun. For standard Vic 20. **$19.95.**

HEAD-ON Players have been known to start playing Head-On at 8:30 pm and at 2:00 am wonder where time went. Move your car as fast as you can dare around the tracks. You get three cars and must avoid the computer car. **$17.95.**

PARATROOPER You are the only one left to stop them. The sky is full of enemy choppers. Paratroopers keep dropping into your area. They are out to destroy you. Wait till you see the climax of this game — you won't believe it. **$19.95.**

GRAVE ROBBERS A thrilling adventure game like never before, Grave Robbers will have you crawling under your seat as the thunder roars and the rain pours. Try to work out the clues to opening the grave of "LEO OIL" in order to get to the tunnel and vault below. Fascinating graphics lend a lot to this game. If you think you are good at adventure games, try this one!! **$19.95.**

ADVENTURE PACK I — (3 programs) Moon Base Alpha — Find your way through to the central control room which will give you access to the necessary equipment needed to destroy the meteor which is racing towards Moon Base Alpha.
Big Bad Wolf — Running away from the wolf is not as easy as it sounds. You must hide so that he cannot find you — NOT only for kids!
Computer Adventure — an unusual adventure where you, the programmer, must get your programs up and running on the computer. A little different, but lots of fun. **$19.95.**

COMMODORE

GRAVE ROBBERS Introducing the first graphics adventure ever available on the Commodore 64! With realistic audio visual effects you explore an old deserted graveyard and frightfully see the perils that lie beyond. **$19.95.**

ANNIHILATOR Now this fast-paced defender style game is available for the Commodore 64. Your aim is to defend you moon base from the attacking aliens who launch heat seeking missiles to destroy you. Using the 64's sprite graphics and excellent sound, Victory Software has managed to come up with this exciting game that will keep you going for hours. **$24.95.**

TREK Commanding the bridge of your starship, you explore the galaxy, fending off the Klingon invasion with your phasers and photon torpedoes. **$16.95.**

ADVENTURE PACK I (3 programs) Big Bad Wolf — adventure based on the Three Little Pigs fairytale. Don't let the woldf gobble you up.
Computer Adventure — re-live the "excitement" of getting your computer.
Moon Base Alpha — you must find a way to destroy the meteor that is racing towards your base. **$19.95.**

ADVENTURE PACK II — (3 programs) African Escape — as the sole survivor of a plane crash you must find your way out of the dark continent.
Hospital Adventure — you are a spy whose mission is to complete the bungled assasination attempt on the evil dictator.
Bomb Threat — get back to town to warn authorities of the bomb plated by terrorists. **$19.95.**

4 PAGER

MICRO-BEE

FROGGER is modelled after the popular game of the same name. Your Frog is in a real predicament. He must firstly hop over a four lane highway, dodging cars and trucks. If he survives, he must then negotiate the flooded river, jumping from log to log until he arrives safely home. FROGGER is a real favourite with children because it is easy to learn but takes ages to master. **$17.50.**

ASTEROIDS PLUS is the finest high resolution graphic arcade game available for the MicroBee computer. It features spinning 3-D point by point resolution graphics, shields, intelligent beings, guided missiles, black holes, high-score board and beathtaking sound effects. ASTEROIDS PLUS took more than 1,000 man hours to write and cost itn excess of $20,000 to develop. You owe it to yourself to experience the best in arcade games on your MicroBee.
"ASTEROIDS must be the best hi-res graphic arcade game on the market for the Bee." *Your Computer*, June, 1983. **$22.50.**

KILOPEDE & GHOST MUNCHER come on the one cassette together! KILOPEDE is the very popular ATARI "CENTEPEDE" game and GHOST MUNCHER is our version of PAC MAC. These two hi-res arcade style games are great value. **$20.00**

METEOR RESCUE is a high speed graphics arcade game. The mission is to shuttle earthlings from the planet surface to the mother ship without colliding with meteors and other spinning 3-D objects. The game increases in difficulty as the score rises. **$17.50.**

DEFENDER needs no introduction. The DEFENDER arcade game is one of the most popular ever produced and we expect that our MicroBee version will be the same. **$22.50.**

TRS-80 & SYSTEM 80

MORGOTH

Yea warrior knight brave & true,
Tis time to face Morgoth with deeds to do,
Hast thou fearless spirit the skill and might?
Dost thou challenge spider, ghost and goul to fight?

Morgoth is a multi roomed arcade adventure which combines the fast paced skill and action of arcade games with the heroic deeds of an ancient world. It's fully animated, smooth graphics and sound effects highlight the CAVERNS OF MORIA, SMEAGORS KEEP and MIRKWOOD FOREST where you are pitted against a variety of monsters with only your magic bow and arrows for protection. Morgoth is a unique action packed adventure allowing you to wander through the enchanted dominion of Morgoth and collect the lost treasures of KAZARD KALLAHAN. But beware! You must escape before the satanic MORGOTH, being of pure evil, is arroused and seeks you!

16K Tape $24.95

STELLAR WARP

SHARP GRAPHICS SUPER SOUND

Animation with superior fighter craft brings you an even greater challenge. As your computer advances your level, the aliens become more dangerous and the harder it is to stay alive! Beware of the dreadful space mines, showering you with deadly Gama bolts. Slowly you sustain more hits and the shield blackens. You activate Stellar Warp, now glowing with indestructible energy, all time and space contorts, allowing you to ram your enemys while in the safety of hyperspace. Spinning and looping aliens!!
SUPER SMOOTH GRAPHICS and SPECTACULAR SOUND EFFECTS once again combine to uphold the unbeatable reputation of our software.

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RALLY RACER

DRIVE THROUGH AN ACTION PACKED MAZE AND TRY TO HIT ALL THE FLAGS BEFORE MORGAN THE MAD MOTORIST OR CRAZY HARRY AND HIS KILLER HOODLUMS CATCH YOU!!!

If you are being followed by a car and can not lose it then you may release a smoke screen and this will slow down the car which is chasing you. You will receive an extra car at every 10,000 points. When you complete a set, the fuel left will be added to your score as a bonus. When you release a smoke screen, this burns up fuel. As your fuel runs out your car will slow down until it stops dead! (and then you will be caught!!). Morgan the mad motorist can go through any part of the maze. You may look at the scanner to see if you are being followed and where the flags are.

If you hit a pool of Oil then your car will go out of control and crash!! If you get the high score then you must type in your Name and press (Enter).
The game ends when all of your cars have been cought or destroyed.

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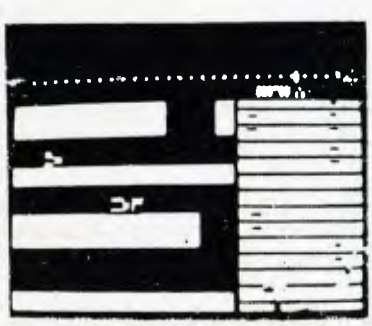

OUTLAND

WHEN POWERS COLLIDE.

GALACTIC WAR IN 2225.

ARGO, Supreme ruler of XENOS had attacked the Fellowship Of Light. It was a death struggle that only one force could survive. It was the might of XENOS, the empire that had defeated half the galaxy, against a brave few warriors, fighting on for freedom and justice.

The Fellowship Chronicles.

Can you defend your colonys fragile structure against the ruthless bombings of the Xenos STAR RAIDERS?

You'll need keen reflexes and skill to overcome the combined might of Xenos SCOUTSHIPS, ADVISORS, and STAR DESTROYERS.

As each attack wave peels away layer after layer of your defence shield, you watch in horror as parts of your colony erupt in cosmic fury! Yet at your fingertips is a formidable array of devastating weapons. MEGABLASTER, SUPAZAPPER, LASER CANNON . . .

Suddenly the deadly Flagship appears above the city and fires a bolt of lazer light!

With a blinding flash of pure energy your screens erupt. A cannon destroyed! One left . . .

The next few seconds will determine victory or oblivion . . .

OUTLAND is another outstanding masterpiece from COSMIC SOFTWARE. Bringing you the best.

16K Tape $24.95

BOSKONE ALERT®

The fourth generation arcade game is here!

The ruthless ruler of the Xenos Empire, Argo, had through sheer force of numbers defeated battle after battle the forces of freedom, the Fellowship Of Light. The Fellowship was not completely crippled. A brave few fought on . . .

Yet rumours abounded of a doomsday weapon. An ultimate fleet of lethal Deathstars, an immense patrol of cyborg fighter escorts, and intelligent, devastating space mines. Its code name: BOSKONE.

The Fellowship Of Light was on its last legs. Earth, one of the few last strong-points of the resistance, was all that stood in the way of total conquest, total power . . .

The Fellowship Chronicles

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STAR CRESTA

Star Cresta takes you beyond the limits of your COMPUTER and into the COSMIC void itself! BEWARE! Iron clad concentration and lightning reflexes combine with the PHOENIX's leathal armament and potent defences, to bring you the most devastating, space-to-space, attack-to-eliminate, intercepter known!!

Will you place your deadly laserlances and energy absorbent shields against the relentless strikes of the fearsome FALCON FIGHTERS. Or will you fall prey to the FIREBIRDS, whose contorting forms swoop down to strike!!

Your shield energy reaches critical and the great mothership lurches into laser range . . . Your cannon's grind their way into her thick hull, but can they reach the EMPRESS and OBLITERATE her to atoms!!

16K Tape $21.95

DESERT PERIL

Your cities have been infected by a deadly virus from the planetary war with the Zagons. Your people's only chance to survive is for you to cross the Great Desert and clear a path for your people to follow. But there are many dangers. The Zagons have mined the desert and have put killer satellites, drone bomber balloons, and flying dragons along the whole trail. The future of your planet's race depends on your skill and daring.

16K Tape $25.50

ALIEN TAXI

Don't let your first impression fool you! This arcade game is not a clone of Lunar Lander. The only similarity of Alien Taxi to Lunar Lander is that you are piloting a vehicle against gravity in both games. Your goal is to pick up and deliver passengers to an underground resort hotel. There is a fare at each of the 12 taxi stands on the first level and if you complete that level there are 12 more on the second level. This is a very skilled game and will take a long time to master.

16K Tape $25.50

COSMIC SOFTWARE

PERSONAL and yet PROFESSIONAL

The ADMATE DP-80 is a compact Desk-Top Dot Matrix Serial Impact Printer used for hardcopy of data from any micro-computer, personal computer, office computer etc. It will print upper and lower case, alpha-numeric characters in both Normal and Italic fonts, in condensed normal or enlarged sizes and in normal or enhanced modes.
It features full Bit-Image Graphics under software control. In addition the Built-In Graphics set includes a range of standard graphic symbols.

FEATURES

- ★ **BOTH FRICTION AND ADJUSTABLE SPROCKET FEEDS AS STANDARD FITTINGS**
- ★ **HIGH PRINT QUALITY FROM CARBON FILM RIBBON**
- ★ **LOGIC SEEKING FOR FASTER THROUGHPUT**
- ★ **HIGH RESOLUTION BIT IMAGE GRAPHICS (640 DOTS/LINE)**
- ★ **BUILT-IN GRAPHICS SYMBOLS**
- ★ **SELF-STACKING PAPER BASKET**
- ★ **EUROPEAN CHARACTER SETS AVAILABLE ON APPLICATION**

Functional specifications

Printing method	Serial impact dot matrix.
Printing format	Alpha-numeric–7×8 in 8×9 dot matrix field. Semi-graphic(character graphic) – 7×8 dot matrix. Bit image graphic – Vertical 8 dots parallel, horizontal 640 dots serial/line.
Character size	2.1mm(0.083")-W×2.4mm(0.09")-H/7×8 dot matrix.
Character set	228 ASCII characters; Normal and italic alpha-numeric fonts, symbols and semi-graphics.
Printing speed	80 CPS, 640 dots/line per second.
Line feed time	Approximately 200 msec at 4.23mm(1/6") line feed.
Printing direction	Normal–Bidirectional, logic seeking. Superscript and bit image graphics – Unidirectional, ieft to right.
Dot graphics density	Normal – 640 dots/190.5mm(7.5") line horizontal. Compressed characters – 1,280 dots/190mm (7.5") line horizontal.
Line spacing	Normal – 4.23mm (1/6") Programable in increments of 0.35mm (1/72") and 0.118mm (1/216")
Columns/line	Normal size – 80 columns Double width – 40 columns Compressed print – 142 columns Compressed/double width – 71 columns The aboves can be mixed in a line.
Paper feed	Adjustable sprocket feed and friction feed.
Paper type	Fanfold. Single sheet. Thickness – 0.05mm (0.002") to 0.25mm (0.01"). Paper width – 101.6mm (4") to 254mm (10")
Copies and thickness	Original plus 3 coipies by normal thicikness paper.

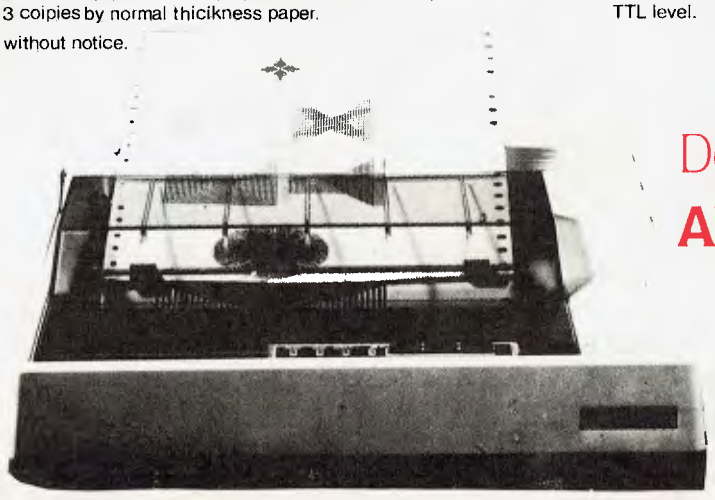
The specifications subject to change without notice.

Mechanical specifications

Ribbon	Cartridge ribbon (exclusive use), black.
MTBF	5 million lines (excluding print head life)
Print head life	Approximately 30 million characters (replaceable).
Dimensions	377mm (14.8")-W×295mm (11.6")-D×125mm (4.9")-H incl. sprocket cover.
Weight	Approximate 5.3kg.(11 lbs)
Power requirement	100VA max.
Temperature	Operating – 5 to 40 degree C (41 to 104 degree F). Storage – minus 30 to 70 degree C (–22 to 158 degree F).
Humidity	Operating – 5 to 90 percent RH, no condensation. Storage – 0 to 95 percent RH, no condensation.
Shock	Operating – 1G(less than 1 msec.)
Vibration	Operating – 0.25 G, 55 Hz. max. Storage – 0.5 G, 55 Hz. max.
Insulation resistance	10 Meg ohm between AC power line and chassis.
Dielectric strength	Between AC power line and chassis, AC 1KV(RMS) 50Hz. or 60Hz. during one minute and no abnormal condition shall be observed.

Interface specifications

Interface	Standard Centronics parallel. Optional RS-232C, 20MA Current Loop, IEEE-488
Data transfer rate	4,000 CPS max.
Synchronization	By external supplied STROBE pulses.
Handshaking	By ACKNLG or BUSY signals.
Logic level	Input date and all interface control signals are TTL level.



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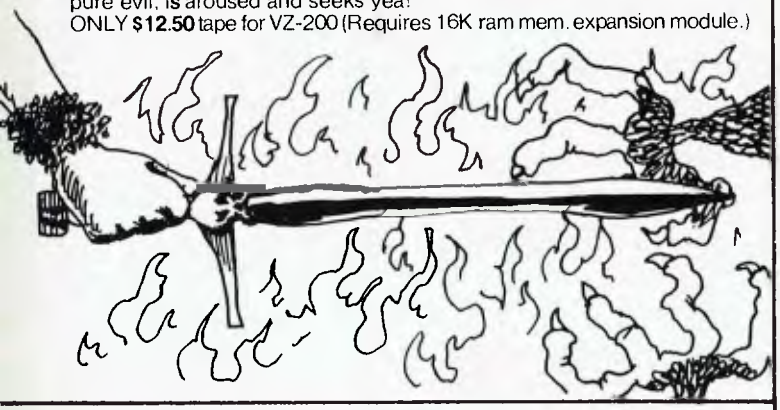

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This is our unique quick-reference guide, reprinted every month to help our readers pick their way through the most important pieces of (necessary) jargon found in APC. While it's in no way totally comprehensive, we trust you'll find it a useful introduction. Happy microcomputing!

Probably the first thing you noticed on picking up this magazine for the first time was the enormous amount of unintelligible-looking jargon. Well, in the words of *The Hitch-hikers' Guide to the Galaxy*, don't panic! Baffling as it may sound, the jargon does actually serve a useful purpose. It's a lot easier to say VDU, for example, than 'the screen on which the computer's output is displayed'. This guide is intended to help you find your way around some of the more common 'buzzwords' you're likely to come across in the pages of *APC*.

For those completely new to computing, let's start with the question: what is a microcomputer? We can think of a micro as a general-purpose device as opposed to a typewriter which can only be used for typing, a calculator to perform calculations, a filing-cabinet to file information and so on. A micro can do all those things and more.

If it is to be of any use, a general-purpose device needs some way of having a function assigned to it. We do this by giving the computer a set of logical instructions called a **program**. The general term for computer programs is **software**. Every other part of a microcomputer system is known as **hardware**. 'If you can touch it, it's hardware.'

Programs must be written in a form the micro can recognise and act on — this is achieved by writing the instructions in a code known as a **computer language**. There are literally hundreds of different languages around, the most popular of these being **Basic**. Basic is an acronym of **B**eginners' **A**ll-purpose **S**ymbolic **I**nstruction **C**ode. Although originally intended only as a simple introductory language, Basic is now a powerful and widely-used language in its own right.

Other languages you're likely to come across in *APC* include **Forth, Pascal, C** and **Comal**. These are known as **high-level** languages because they approach the sophistication of a human language. You'll also see references to the **low-level** languages, **assembly language** and **machine code**. We'll look at high and low-level languages in a moment.

The heart of a micro, the workhorse, is the **processor** or **Central Processing Unit (CPU)**. The processor usually consists of a single silicon chip. As with computer languages, there are a number of different types of processor around, the Z80, 6502 and 8088 being the three most common. The processor is nothing magical — it's just a bunch of electronic circuits. It's definitely not a 'brain'.

Being electronic, the processor's circuitry can be in one of two states: on or off. We represent these two states by **binary** (base two) notation, the two binary digits (known as **'bits'**) being 0 and 1. It is possible to program computers in binary notation, otherwise known as **machine code** (or machine language) programming.

Machine code is called a low-level language because it operates at a level close to that 'understood' by the processor. (Languages like Basic are known as **high-level languages** because they are symbolic, operating at a level easily understood by people but not directly understood by the processor.)

Between high-level languages and machine code is a low-level language known as **assembly language** or, colloquially, **assembler**. This is a mnemonic code using symbols which the processor can quickly convert to machine code.

Since there is no binary equivalent of a comma or the letter 'a', for example, we need some sort of code to represent each character to be processed by the computer. In order to simplify communication between computers, a number of standard codes have been agreed on. The most widely used of these codes is the **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange, **ASCII**. This system assigns each character a decimal number which the processor can then convert to its binary equivalent.

There are two types of program to do this translation for us. The first of these is a **compiler** which translates our whole program permanently into machine code. When we compile a program, the original high-level language version is called the **source code** while the compiled copy is called the **object code**. Compiled programs are fast to run but hard to edit. (If we want to change a compiled program, we either have to edit it in machine code (extremely difficult) or we have to go back to a copy of the source code.) For this reason there is a second translation program: an **interpreter**. An interpreter waits until we actually run (use) the program, then translates one line at a time into machine code — leaving the program in its original high-level language. This makes it slower to run than a compiled program, but easier to edit.

There are two strange-sounding Basic words you're likely to come across: **POKE** and **PEEK**. When you program in a high-level language, you are normally unable to choose which part of the machine's memory the processor will use to store things. This makes programming easier as you don't need to worry about memory locations, but slows down the program since the processor has to 'look up' addresses for you. Using the POKE command, however, you can 'POKE' a value directly into a desired memory address. 'POKE 10000,56', for example, puts the value 56 into memory location 10000. PEEK allows you to examine the content of a particular memory address. If you were to follow the above POKE with 'PEEK 10000', the computer would respond by displaying the value 56. (POKEing and PEEKing is normally done to increase program speed. It's a compromise between Basic and machine code.)

So far, we have a processor and a program. Since a computer needs somewhere to store programs and data, it needs some kind of memory. There are two types of memory known as **R**ead **O**nly **M**emory (**ROM**) and the badly-named **R**andom **A**ccess **M**emory (**RAM**). ROM is so-called because the processor can **'read'** (get things out of) its contents, but is unable to **'write to'** (put things in) it.

ROM is used to store **firmware**, which consists of software permanently available on the machine. An interpreter is a typical example of firmware (stick with it: it gets easier!).

RAM differs from ROM in two important ways. Firstly, you can write to it as well as read from it. This means that the processor can use it to store both the program it is running and data (information). The second important difference is that RAM needs a constant power-supply to retain its contents: as soon as you switch the computer off, you lose your program and data.

Memory is described in terms of the number of characters we can store in it. Each character is represented by an 8-bit binary number. 8 bits make one byte and 1024 bytes make one **kilobyte** or **1k**. 32k, for example means that the computer can store about 32000 characters in its memory. If 1024 sounds like an odd number, remember that everything is based on the binary system, thus 1,2,4,8,16 ... 1024 being the nearest binary multiple to 1000.

There are numerous forms of **permanent** or **backup** storage, but by far the most common are the **floppy disk** and **cassette**.

Floppy disks or diskettes are circular pieces of thin plastic coated with a magnetic recording surface similar to that of tapes. The disk, which is enclosed in a protective card cover, is placed in a **disk drive**. Disk drives comprise a high-speed motor to rotate the disk and a read/write head to record and 'playback' programs and data.

The disk is divided into concentric rings called **tracks** (similar to the tracks on an LP) which are in turn divided into small blocks by spoke-like divisions called **sectors**.

There are two methods for dividing the disk into sectors. One method is called **hard-sectoring**, where holes punched in the disk mark the sectors, and the other is **soft-sectoring** where the sectors are marked magnetically. (The reason that disks from one machine can't be read by a different make is that each manufacturer has its own way of dividing up the disk. Recently, however, manufacturers do seem to have begun to acknowledge that this situation can't go on forever, and they are working on making their disks compatible with each others.')

Since the computer needs some way of tracking the whereabouts of everything on the disk, we have a program called a **Disk Operating System**, more usually known simply as the **Operating System (DOS** or **OS)**. The operating system does all the 'house-keeping' of the disks, working out where to put things, letting the user know what is on the disk, copying from one disk to another and so on. As you might expect by now, there are lots of different operating systems available (each with its own advantages and disadvantages). The two most popular OSs are **CP/M** (Control Program for Micros) and **MS-DOS** (MicroSoft Disk Operating System).

Floppy disks provide a reasonably fast and efficient form of secondary storage and are cost-effective for business machines. For home computers, however, the usual form of program and data storage is on ordinary cassette tape using a standard cassette recorder. This method of storage is slow and unreliable, but is very cheap and is adequate for games and the like.

Another type of disk you'll see referred to is the **hard disk**. This is an extremely efficient method of storing large amounts of programs and data. Hard disk capacity generally starts at around 10 **Mbytes** (10 million bytes) and rises to . . . well, you name it. Besides offering a much greater capacity than floppies, hard disks are more reliable and considerably faster. They are, however, much more expensive than floppy drives.

Since computers need some way of communicating with the outside world, we need input and output devices. Input and output devices include all manner of things from hard disk units to light-pens, but the minimum requirement for most applications is a typewriter-style **keyboard** for input and a tv-like **Visual Display Unit** for output. The Visual Display Unit is variously referred to as a **VDU, Cathode Ray Tube (CRT)** and **monitor**.

The various component parts of a computer system (processor, keyboard, VDU, disk drives, etc) may all be built in to a single unit or they may be separate, connected by cables.

Take this paragraph slowly and it makes sense! When a computer communicates with an outside device, be it a printer or another computer, it does so in one of two forms — **parallel** or **serial**. **Parallel input/output (I/O)** requires a number of parallel wires. Each wire carries one bit, so with 8 wires we can transmit/receive information one byte at a time (8 bits = one byte, remember). **Serial I/O**, in contrast, uses a single wire to transmit a series of bits one at a time with extra bits to mark the beginning and end of each byte.

To enable different devices to communicate with each other in this way, standards have been agreed for different **interfaces**. An interface is simply a piece of circuitry used to connect two or more devices. The most common standard serial interface is the **RS232** (or **V24**) while the **Centronics** standard is popular for parallel interfaces.

When two computers want to communicate with each other over a distance, there are again two ways of doing it. Both methods use the public phone network. The simplest and cheapest method is to use a device known as an **acoustic coupler**. This simply plugs into your computer, and has a receptacle into which you place your telephone handset. However an acoustic coupler is slow and not exceptionally reliable.

A more sophisticated (and correspondingly more expensive) method is to use a **modem**. Unlike an acoustic coupler, a modem is wired into the telephone system and you should get permission for this from Telecom.

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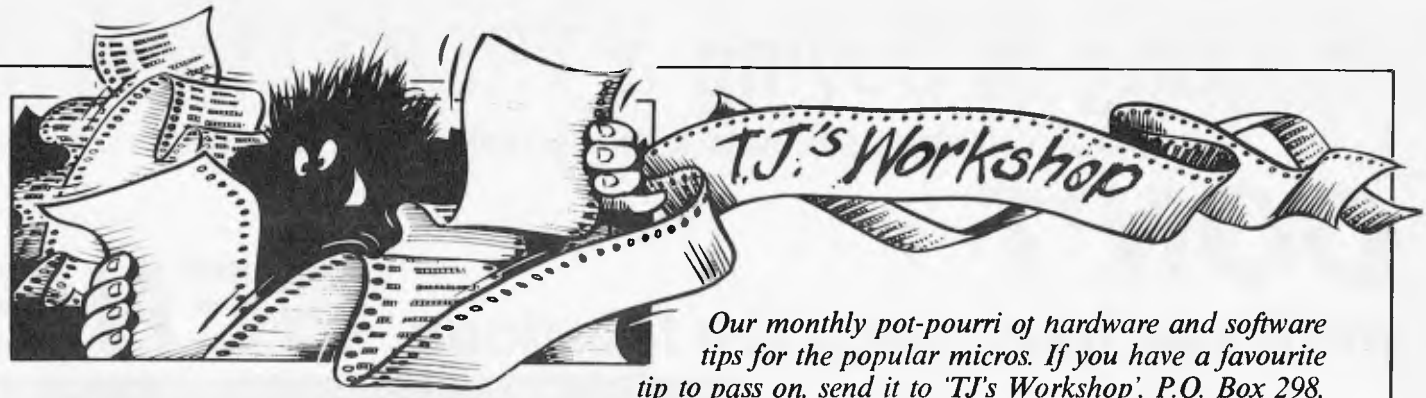

Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to 'TJ's Workshop', P.O. Box 298, Clayton, Vic. 3168. Please keep your contributions as concise as possible. We will pay $10—$30 for any tips we publish. APC can accept no responsibility for any damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

Leap Frog

The following program in Basic will relocate any machine code routine to any other part of the memory, and will change the JMP addresses in the routine, so that it will still work in the new space.

This can be used to copy ROM into RAM for changing routines, or for your own routines that you wish to move; for example, from the second cassette buffer to the top of memory. I have found it particularly useful for moving a cassette-based toolkit of mine down RAM to leave room for my own routines.

The data in lines 5000 to 5070 are the number of bytes taken up by each instruction; a zero means that the instruction does not exist.

This routine should work on any machine with a 6502 processor — it has been tested on a PET and VIC. It will not deal with data in a routine, but it will tell you where the data is. The best way to relocate programs with data in them is to relocate up to the data then relocate the data with a FOR . . . NEXT loop, then relocate the rest of the routine.

To use the routine, RUN it and type in the start and end addresses of the machine-code to be moved, then type the start address of the new location. The program can take a longish time to run, because it checks each address to see whether it is a JMP instruction, and then each JMP to see whether it addresses the program itself, or an external routine.

C Steadman

```
1 dimn%(255):fori=0to255:readn%(i):next
10 input"where does the routine currently lie (from where to
where)";a,b
20 input"where should it lie";c
30 ifa0orb0ora65535orb65535orc0orc65535orbathen10
40 df=a-c:i=a
45 ifibthenend
50 f=peek(i):ifn%(f)=0thenprint"not machine code at
address"i:end
60 ifn%(f)=1thenpokei-df,f:i=i+1:goto45
70 ifn%(f)=2
thenpokei-df,f:pokei-df+1,peek(i+1):i=i+2:goto45
80 iff76
thenforj=0to2:pokei-df+j,peek(i+j):next:i=i+3:goto45
90 x=peek(i+1)+256*peek(i+2):ifxaorx
bthenforj=0to2:pokei-df+j,peek(i+j):next:i=i+3:goto45
100
x=x-df:pokei-df,76:o=int(x/256):pokei+2-df,o:pokei+1-df,x-o*256:i=i+3:goto45
```

```
5000
data0,2,0,0,0,2,2,0,1,2,1,0,0,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,0
5010
data3,2,0,0,2,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,0
5020
data1,2,0,0,0,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,0
5030
data1,2,0,0,0,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,1
5040
data0,2,0,0,2,2,2,0,1,0,1,0,3,3,3,0,2,2,0,0,2,2,2,0,1,3,1,0,0,3,0,0
5050
data2,2,2,0,2,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,2,2,2,0,1,3,1,0,3,3,3,0
5060
data2,2,0,0,2,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,0
5070
data2,2,0,0,2,2,2,0,1,2,1,0,3,3,3,0,2,2,0,0,0,2,2,0,1,3,0,0,0,3,3,0
```

Apple II Exec files

This is a small program which I have written for use on my Apple II to help in maintaining EXEC files. It will work equally well on any ASCII text file. Files may be created or modified, and listed to screen or printer. When saving an amended file the option is given to save it with a new file-name.

My system is an Apple II 48k, DOS 3.3, and a printer. If any changes are needed to the program for other configurations, they should be fairly minor. The following notes should be of interest.

Any line number ending in '1' (e.g. 3001) is branched to from somewhere.

All commands (at lines 2001 and 3001) are truncated to the leftmost character before being examined. So, for example, to END the program the command EEK (or even EXIT!) would work just as well.

The question " . . . CONTINUE?" at line 3210 espects a reply of YES; again only the first character is used.

The ADD command adds new records after any existing ones. To terminate this command enter a null record — i.e. just press RETURN.

The program will currently hold up to 200 records — to alter this change the value of NT at line 1200.

When the Apple INPUTs a record/line a comma is treated as a separator, which causes two problems. When reading an old file from the disk the records may contain

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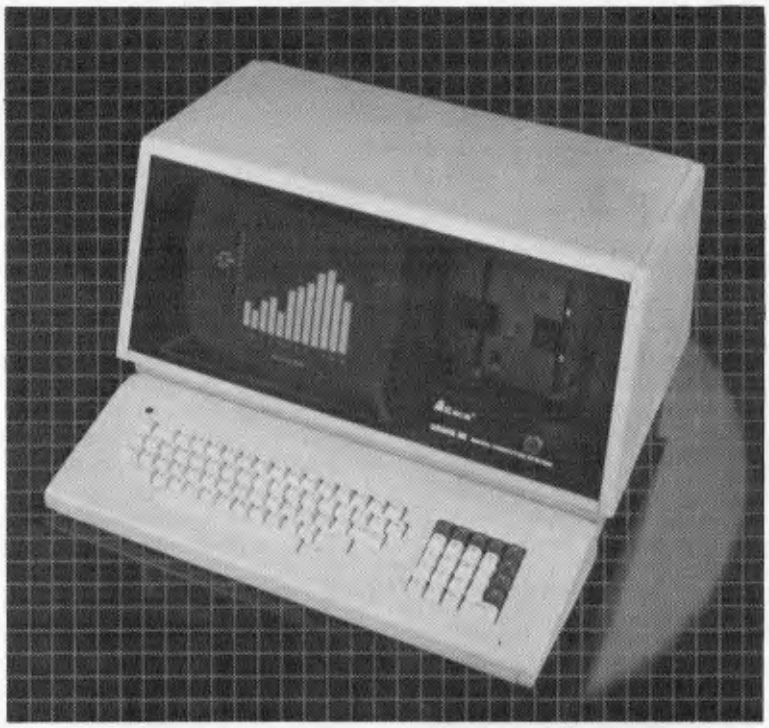

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Graphics High Resolution	640 x 288	NO	NO	640 x 240	320 x 240	?	640 x 200
Display Format	80 x 24 64 x 16	80 x 24 64 x 16	80 x 24	80 x 24	80 x 24	80 x 24	80 x 25
Disk Drives in Unit	2 x 5¼	2 x 5¼	2 x 5¼	2 x 5¼	2 x 5¼	2	2 x 5¼
Capacity in Unit	1.4 MEG	750 K	800 K	736 K	720 K	800 K	320 K
Maximum Drives	4	4	2	2	2	2	2
Manufacturers Winchester Disk Capacity	27	8	10	—	NO	NO	10
Keyboard Function Keys	8	2	NO	10	—	—	10
Detached	YES	NO	YES	YES	YES	YES	YES
8" Drive Capacity	YES	NO	NO	NO	NO	NO	NO
Serial Interface	1	—	1	1	2	1	—
Parallel Interface	1	1	1	1	NO	1	—
Multiple Disk Formats	YES	NO	YES	NO	NO	NO	NO
Expansion Slots	2	Ø	Ø	Ø	1	?	5
Operating Systems Supplied	CPM NEW DOS	TRS DOS	CPM	CPM	CPM	CPM	PC DOS
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These figures are based on standard units without optional extras if available.

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commas (e.g. POKE 103,0). The routine at lines 2130-2141 therefore uses GET to read each character. The second problem occurs when entering a new line from the screen: if this line contains commas (or colons) then the whole text must be enclosed in string quotes. These quotes are not stored as they are removed by the Apple INPUT routine.

When listing to the screen, the program asks for a delay value. This is used to slow down the listing, and is really intended to give time to examine long files before the lines scroll out of sight. If no file will exceed 20 records then lines 4610 and 4620 can be deleted and the FOR .. . NEXT loop in line 4640 removed.

W Wood

TRS-80/ SYSTEM 80 sound input

This short Basic subroutine will allow an unexpanded System 80 or TRS-80 to respond to any sound.

First, connect a microphone to the MIC socket of your cassette recorder or amplifier. (If you have a built-in microphone to your cassette recorder, you will not need to do this.)

Most cassette players will need to be set to record so that they become amplifiers. To do this, open the cassette magazine, push your finger down on the record prevention tab inside, press RECORD and PLAY and let go of the tab — the cassette recorder should now be 'recording' although there is no cassette inside. Alternatively place a cassette in the recorder and set it to record.

Connect the EAR socket to the computer. TRS-80 users can use the normal cassette port, but most System 80 owners will have to use the second cassette port.

To make the computer respond to sound, use the subroutine 65520 OUT 255,4:FORL=1 TO 5:NEXT:NOISE=INP(255) AND 128:RETURN. If there has been a noise, the variable NOISE will hold a non-zero value.

You may find that this is too sensitive (e.g. it responds to someone rustling newspaper). To remedy this, adjust the volume control, or, if you have no volume control, stick a lump of Bluetak or plasticine over the microphone.

For example:

```
200 PRINT "SNAP FINGER TO CONTINUE"
210 GOSUB 65520:IF NOISE=0 THEN 210
. . . rest of program.
```

NB: If using the second cassette port, you will need to add OUT 254,16 at the start of your program and OUT 254,0 at the end.

Steve Goldman

Hit and run

The manual for the Tandy Color does not mention the availability of an auto-repeat function. The keys currently being depressed are stored in locations 338-345 of the memory and are therefore accessible through the PEEK command. This is demonstrated by the following program:

```
10CLS
20FORX=0 TO 7
30PRINT@X*64+2, USING "PEEK(# # #) ="X+338;
40PRINT PEEK (X+338)
50NEXT
60GOTO20
```

It can be seen while RUNning this program that,

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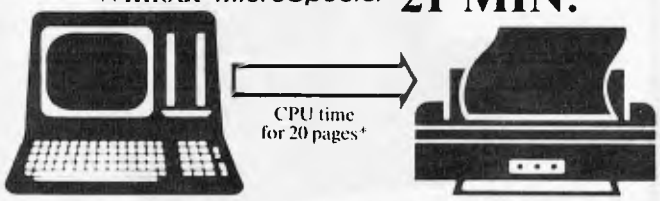

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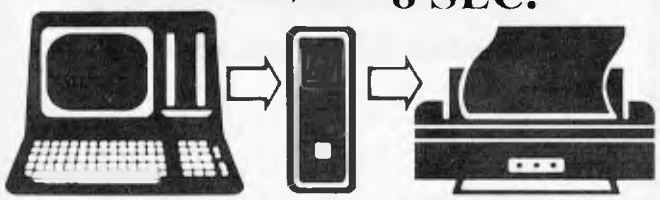

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T.J.'s Workshop

on depressing various keys, the numbers stored in these locations change — for example, depressing 'C' causes the contents of memory location 341 to be reduced by one.

From this demonstration, it can be seen that a table can be made summarising the ways in which the depression of the keys affects the memory. The table for the Tandy is shown.

For example if 'Q' is depressed then location 339 will read 251 and if 'I' is depressed at the same time then this location will read 235.

To demonstrate the way this can be used to improve programs the following program may be run:

```
10 CLS:INPUT "DO YOU
   WANT
   A)TO MOVE A DOT OR
   B)DRAW LINES";D$
20 CLS0
30 X=31:Y=16
40 XR=X:YR=Y
50 X=X+(PEEK(343)=247)
   -(PEEK(344)=247)
   +(X>62)-(X<1)
60 Y=Y+(PEEK(341)
   =247)-(PEEK(342)
   =247)+(Y>30)-(Y<1)
70 IF D$="A"THENRESET
   (XR,YR)
80 SET(X,Y,7)
90 GOTO 40
```

While RUNning this program, note that you can move the block using the cursor keys and may combine the keys to move diagonally.

On the Tandy Color, while a program is RUNning, the memory location 135 contains the last character entered on the keyboard, as shown:

```
10 CLS
20 PRINT@64,CHR$
   (PEEK(135));
30 PRINT@66,"WAS THE
   LAST CHARACTER
   ENTERED"
40 GOTO20
```

A Rowe & D Chirico

Memory Location Affected	1	Subtracts From 255 2	4	8	16	32	64
338	@	H	P	X	0	8/(	ENTER
339	A	I	Q	Y	1/!	9/)	CLEAR
340	B	J	R	Z	2/"	:/*	BREAK
341	C	K	S	↑	3/#	+/;	—
342	D	L	T	↓	4/$	,/<	—
343	E	M	U	←	5/%	-/=	—
344	F	N	V	→	6/&	./>	—
345	G	O	W	SPACE	7/'	//?	—

VIC Renumber

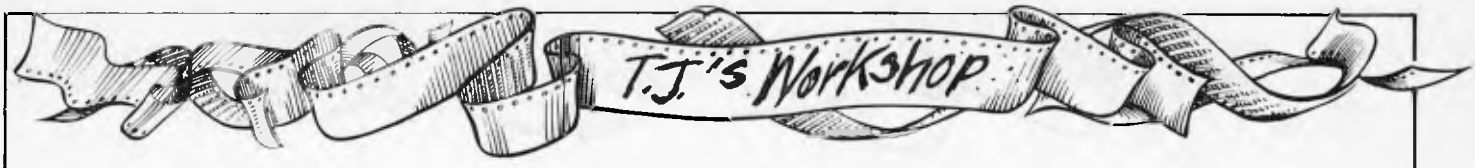
The accompanying Basic program stores a relocatable machine language routine for renumbering VIC Basic programs. Since it is relocatable the user may determine where the routine resides by changing the constant in the POKE statement.

Location 673 was chosen as the default since this does not reduce the memory available for Basic programs or inhibit the use of the data set.

To renumber a program, the line number increment (1-255) and the initial line number (0-255) must be POKEd into locations 251 and 252 respectively and then the routine invoked by a SYS to its start location.

This routine will not alter line numbers referenced in GOTO or GOSUB statements. It is a good idea to load and execute this Basic Program immediately after powering up so as to have the renumber routine available during a programming session.

M O'Neal



Loading programs without losing variables

If you *LOAD a BBC Basic program instead of LOADing it, the Basic interpreter will not be given the chance to clear the variables.

If the variables start after the end of the *LOADed program (either the previous program was longer than the new one, or LOMEM was altered to start high enough), then you can use all the variables created by the previous program in the *LOADed program provided you use GOTO instead of RUN to start the program.

I have found this extremely useful when assembling large amounts of machine code from several programs without losing any labels.

Adrian Stephens

MBasic 'PRINT USING'

The PRINT USING command in MBasic is used to print strings or numbers using a specified format. The most frequent format variations used in a program will generally be:
— variations in the width of string fields; and
— variations in the width and number of decimal places of numeric fields.

The four functions shown will handle the most commonly used formats in a very simple way, so that PRINT USING FNUS$(X);A$ will print A$ in a field width of X PRINT USING FNU0$(X);A will print A in a field width of X with no decimal places, and likewise FNU1$(X) and FNU2$(X) will format numbers with one and two decimal places respectively.

The choice of 'US', 'U0', 'U1' & 'U2' is, of course, arbitrary; I used 'U' to represent USING, 'S' = string, '0' = no decimal places, etc.

Joe Ryan

Sharp GET routine

Here is a very fast GET key routine and some useful POKEs for the Sharp MZ-80K.

First type in the following program and run it.

```
10 FOR T=1 TO 7:READ A:
POKE24552+T,A:NEXT
20DATA
205,27,0,50,240,95,201,0
```

From now on USR(24553): I=PEEK(24560) will return the ASCII value of any key pressed and put this value into I.

For unextended Basic POKE10167,1 will have to be entered first.

Some useful POKES — POKE6636,133 defines the left shift key as shift and break. POKE4360,1 and POKE10680,1 disables the list and saves functions. To restore use 0.

POKE5412,35 disables the POKE command until POKE5412,80 is entered. POKE commands can still be used in programs. POKE10682,1 before saving a program will make it auto-run when loaded.

M Slater

Commodore in merger shock?

Among the facilities lacking from Commodore 64 Basic is the ability to merge programs. The short machine code routine given in figure 1 provides this facility.

To use it, LOAD the first part of your program. Add this Basic routine into it and RUN it. Now type SYS 40448. LOAD the second part of the program and type SYS 40468. You should find you have one complete program. Remember to delete the merge routine after you have used it.

You should ensure that the program being merged has higher line numbers than the first program. The routine still works but the program's line numbering will be mixed up if you don't.

M Seerman

```
1000 REM ** MERGE FOR CBM 64
1010 REM POKE 52,159:POKE 56,159
1020 FOR I=40448 TO 40478:READ A : POKE I,A: NEXT
1030 DATA 216,56,173,45,0,233,2,141,43,0,173,46
1040 DATA 0,141,44,0,96,234,234,234,169,1,141,43
1050 DATA 0,169,8,141,44,0,96
```

Cross the BORDER problem

The Spectrum's BORDER command causes occasional problems. Try this program:

```
10PAPER5 : CLS : BORDER
4
30PAUSE0
40PAPER3 : CLS : BORDER
2
60PAUSE0 : GO TO 10
```

The two-line input area at the bottom of the screen should take the BORDER colour but doesn't. This can, of course, be cured by clearing the screen after executing BORDER. But this wipes out any picture on the screen. A simple fix is to use INPUT INKEY$. This will change the two-line band to match the border. Try it at lines 20 and 50.

G Galea

Bee Key

If you have ever tried to find out if a key is being held down on the MicroBee you will have found that the Basic KEY$ command is of no use.

The subroutine I have written solves the problem. It finds out whether a key is being held down independant of any other key being pressed at the same time, and independent of how long the key has been held down. (The Basic interpreter uses a similar routine to scan the keyboard.)

To use this subroutine, you must first find the address of the key you are checking from Table 1 (e.g. A=0010H D=0040H Z=01A0H Space bar=0370H). This is the address that the 6545 uses to identify the key.

If listing 1 is being used, the key's address is simply loaded into the BC register pair and the subroutine is CALLed. If the key was held down at the time of the CALL then the Z flag will be RESET on return from the subroutine.

If listing 2 is being used, (i.e. from Basic) the USR(x,y) function is used where x equals machine language starting address (12288) and equals the

key's address in decimal. The USR function will return -1 if that particular key is being held down. '-1' was chosen because it indicates a TRUE value if used in an IF THEN statement.

For example

```
00500 IF USR(12288,16)
        THEN PRINT" A is pressed"
00510 IF USR(12288,416)
        THEN PRINT" Z is pressed"
00520 IF USR(12288,880)
        THEN PRINT" SPACE BAR
        is pressed".
```

David Morrison

Listing 1

```
ØØ1ØØ ;KEY - tests for a key being held down
ØØ11Ø ;CLASS: position independant, registers not saved
ØØ12Ø ;TIME CRITICAL?: No
ØØ13Ø ;SUBr DEPENDANCE: none
ØØ14Ø ;INPUT: BC equals address of key to test for
ØØ15Ø ;OUTPUT: NZ and BC=-1 if key held down
ØØ16Ø ;        Z flag set and BC=0 if key not held down
ØØ17Ø ;        A BC D registers altered
ØØ18Ø ;STACK USE: zero
ØØ19Ø ;LENGTH: 45 bytes
ØØ2ØØ ;COMPUTER: Microbee,  Z8Ø / Z8ØA
ØØ21Ø
ØØ22Ø KEY     LD      D,C         ;Save LSB of key address
ØØ23Ø         LD      C,13        ;Point to port
ØØ24Ø         LD      A,1
ØØ25Ø         OUT     (11),A      ;Set char ROM read latch
ØØ26Ø         LD      A,19
ØØ27Ø         OUT     (12),A
ØØ28Ø         OUT     (C),D       ;Set LSB of UPDATE register of 6545
ØØ29Ø         DEC     A
ØØ3ØØ         OUT     (12),A
ØØ31Ø         OUT     (C),3       ;Set MSB of UPDATE register of 6545
ØØ32Ø         LD      A,16
ØØ33Ø         OUT     (12),A
ØØ34Ø         IN      A,(C)       ;Reset LIGHT PEN flag
ØØ35Ø         LD      A,31
ØØ36Ø         OUT     (12),A
ØØ37Ø         OUT     (C),A       ;Reset UPDATE flag
ØØ38Ø WAIT    IN      A,(12)
ØØ39Ø         RLA
ØØ4ØØ         JR      NC,WAIT     ;Wait for a keyboard update
ØØ41Ø         AND     8ØH         ;Set Z flag for key pressed?
ØØ42Ø         OUT     (11),A      ;Reset char ROM read latch
ØØ43Ø         LD      BC,Ø
ØØ44Ø         RET     Z           ;Return if no key
ØØ45Ø         DEC     BC          ;BC equals -1
ØØ46Ø         RET                 ;Return if key pressed
ØØ47Ø
ØØ48Ø         END
```

Listing 2

```
ØØ1ØØ REM Subroutine to store machine code at 3ØØØH = 12288
ØØ11Ø FOR A=12288 TO 12332:READ B:POKE A,B:NEXT A
ØØ12Ø RETURN
ØØ13Ø DATA 81,14,13,62,1,211,11,62,19,211,12,237,81,61,211,12
ØØ14Ø DATA 237,65,62,16,211,12,237,12Ø,62,31,211,12,237,121
ØØ15Ø DATA 219,12,23,48,251,23Ø,128,211,11,1,Ø,Ø,2ØØ,11,2Ø1
ØØ16Ø END
```

Table 1

Most significant byte	Least significant byte: ØØ	1Ø	2Ø	3Ø	4Ø	5Ø	6Ø	7Ø	8Ø	9Ø	AØ	BØ	CØ	DØ	EØ	FØ
ØØ	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Ø1	P	Q	R	S	T	U	V	W	X	Y	Z	{	|	}	~ ^	DEL
Ø2	Ø	! 1	" 2	# 3	$ 4	% 5	& 6	' 7	(8	) 9	* :	+ ;	< ,	= -	> .	? /
Ø3	ESC	BS	TAB	LF	RET	LCK	BRK	SP		CNTR						SHFT

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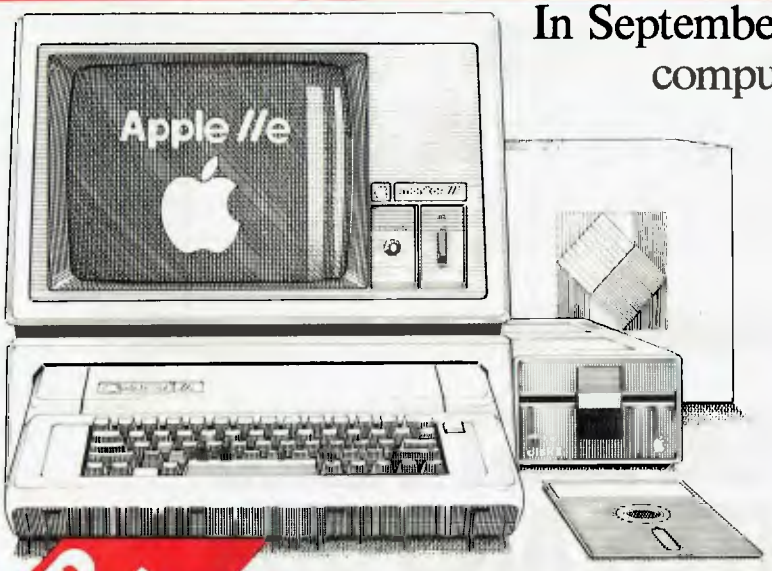

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BANKS' STATEMENT

OF MICE AND MENUS

Martin Banks muses on whether or not the mouse will get ensnared in its own trap.

Wonderful what technology can do, isn't it? Let me, here and now, expound on why I feel the urge to make such a contentious statement.

Once upon a time, many years ago, I was a small person who shared life, bedrooms, Toltoys and bowls of porridge with some parents, some brothers and an averagely indolent tabby cat. The last of these, as is the way of things in most well-organised households, got at least as good a deal as any of the rest of us — indeed it was often better, as the cat had perfected the trick of demand feeding.

It also was given a present at such times as Christmas and its birthday. Sometimes this would just be a piece of amazingly pungent fish, while on other occasions, it would be a trinket or toy.

One year, I remember, said moggy had a particularly successful season in the fields, and often brought us free samples of what it had captured. As a result of this it was decided to purchase, for the cat's birthday, a replica of its captives that it could practise on at home. We felt that if the cat knew there was one there already, it wouldn't bother bringing home any more.

And so it was, on an arbitrarily selected day in September (we never actually knew the cat's real date of birth), the animal was presented with a small brown paper parcel, which it neatly unwrapped. Inside was a grey, be-wheeled, clockwork mouse.

At first, the tabby was particularly taken with this new toy, and many happy minutes were spent with it chasing the mouse here and there. In my desire to please, however, I overwound the motor and with a loud ping, the mouse suffered a terminal coronary. The cat became bored.

In the end, of course, the breakage amounted to no great financial loss, and the investment had served to keep the cat in training at least for a few hours. I wonder if the same can be said of the latest versions of this machine.

I refer to the latest reincarnation of the clockwork cat-teaser, appearing on customers' desks about now. This is the mouse that comes with Lisa, the all-bells-and-whistles computer from Apple. Now this machine has had a great deal written about it, much of which has been complimentary. I do not intend to follow this trend. Instead it is the clockwork cat-teaser that interests me, both for what it can do, and what it represents in user terms.

What the mouse can do, of course, is replace the keyboard of a computer for a wide range of man/machine interactions. It does this in a novel and user friendly way, by relating the top of a desk to the display. Move the mouse around the desk on its little wheels and the cursor of the screen will follow suit, mimicking the track that the mouse has taken. Get the mouse/cursor to the right location and then work can be done, either by pressing buttons on the mouse itself, or via the keyboard.

This is all pretty terrific stuff, the sort of thing that users' dreams are made of. It can also be the stuff of which users' nightmares are made, especially if the user has come to depend on the cat-teaser as the means of communication with the machine. You see, one of the biggest potential problems about the mouse is that, like so many other bits of the stuff of life before it, it is a nasty little mechanical object. As most people will know, nasty little mechanical objects have a boring tendency to break, usually just when you don't want them to.

There have been rumours (unfounded, unwarranted and totally scurrilous, I am sure) that some mice have already been known to . . . well . . . not actually work, shall we say. Either someone has wound the clockwork too hard, or the cat has jumped on it from a great height, causing some form of haemorrhage deep inside its works. Whatever the reason, mice are mechanical, and mechanical very often spells vulnerable to malfunction unless the design is like a tank.

'What the mouse can do, of course, is replace the keyboard of a computer for a wide range of man/machine interactions.'

If this starts to happen any more than occasionally, it could become something of an embarrassment to the mouse makers. They will be honour-bound to find some very heavy-handed cats to road test the devices to make sure they operate reliably under a wide range of conditions, and under a wide variety of positive and negative dexterity among the users.

Manufacturers will have to watch out for the fact that users will expect their mice to be operable: indeed, users will come to rely on them like they now rely on the keyboard itself. It would be a shame to spoil $N,000s, worth of hardware and software investment for two cents worth of mechanical engineering (which is normally the way I view such wonders as my car).

But why are people going to want to use their mice so? The short answer to that is operating systems, things like Smalltalk, the Lisa system, VisiCorp's VisiOn and Digital Research's Concurrent CP/M with the User Interface. With these, at last, the user is starting to get the sort of software service needed to match the potential of the hardware, especially the 16-bit GT computers that are now readily available.

The mice are just another example of the facet of the personal computer that marks the breed out from other types of computer system. They are all remarkably interactive. The human user can sit at the keyboard, watch the display, and get a level of interaction with the machine that in practice is many times faster than that available from most mini or mainframe machines. The mouse just adds to that interactive capability and removes one more layer of the mystique of computing.

That is all wonderful, isn't it? To which the answer is yes . . . but. The 'but' in question is a fast-disappearing one fortunately, for it is the problem of operating systems. Now, I suspect you may be thinking that there are no problems with operating systems. After all, CP/M has been around for years and has a wealth of applications software around to fit it. In the 16-bit market there is Microsoft's MS-DOS which, because of the IBM PC connection, seems set to become the dominant force in bigger machine operating systems. Everything is neat and tidy, so what can be wrong with the world?

But up until now, the personal computer has been predominantly a single-tasking machine, which has meant that it has had a remarkable tendency to become input/output bound. This is a neat form of constipation whereby every and all I/O oriented tasks effectively plug up the works until completed. Perhaps the best example of this is the PRINT run from a word processing file. While the printer sits and chunders away as best it can on your 'N' page report, you might as well make a cup of tea, launch a takeover for BHP or go on holiday to Fiji. You won't get any sense or response from your computer.

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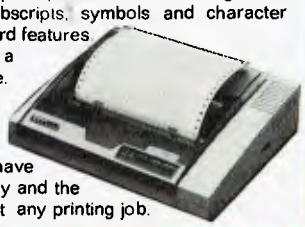

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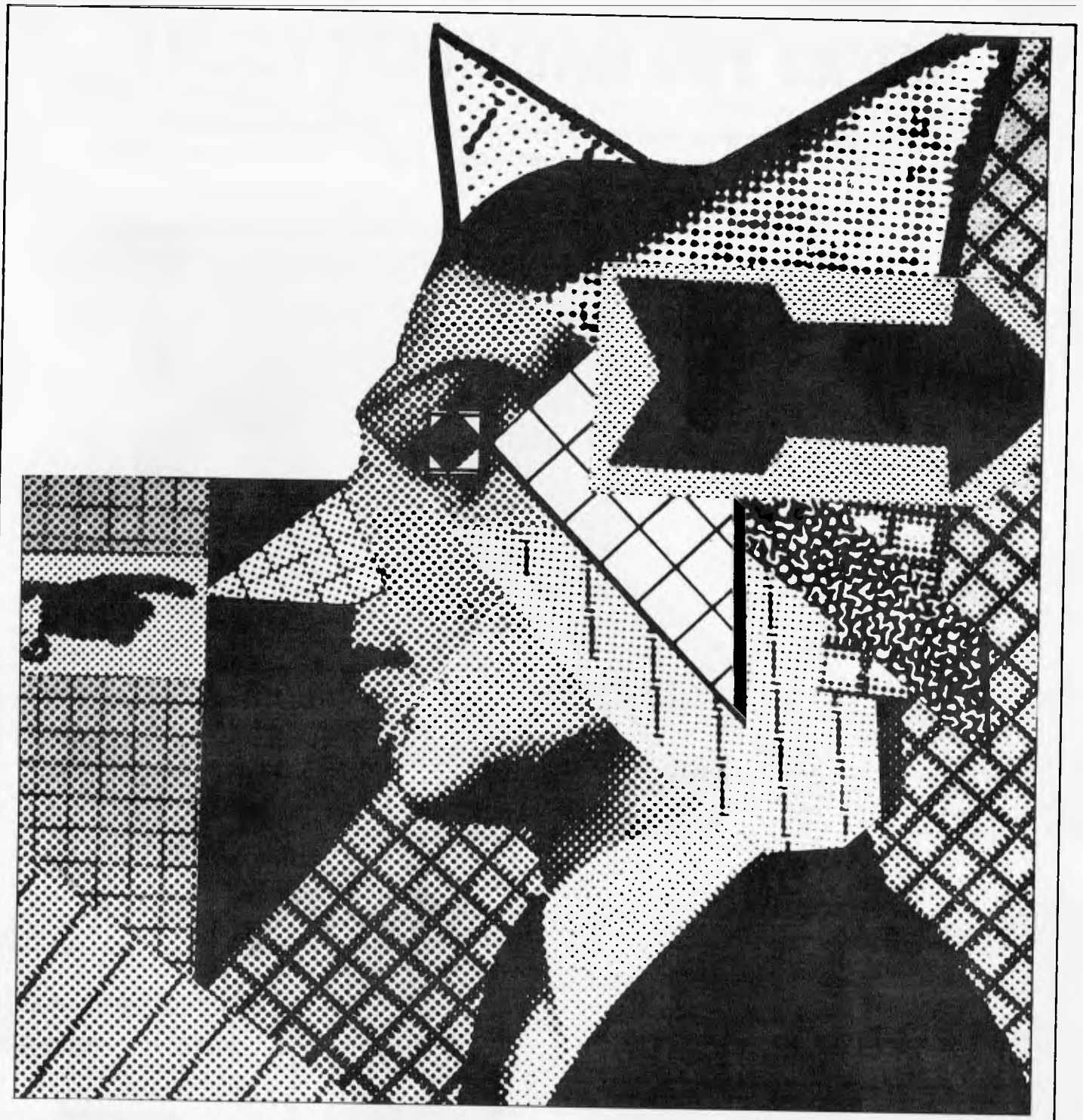

It was precisely this particular problem which prompted Digital Research founder, Gary Kildall, to consider the subject of concurrency. Having to sit and wait for his machine to finish print runs made him aware that he could still be doing other things with it — if it had the right operating system.

His solution to this problem is Concurrent CP/M-86, an operating system that allows a 16-bit computer to run several different programs at the same time. This means that a spreadsheet can be producing figures that can be going into a word processing file that is currently being created, while at the same time the machine is printing out previous efforts.

Couple this capability with the abilities of systems like Lisa or VisiOn, where screen windows can be created and manipulated as desired, and all these new GT computers actually start to live up to their promises on performance. Digital Research is hoping to have a window manager and mouse system available for Concurrent CP/M by the early part of next year — to be called the User Interface — so it will be in there fighting for a major slice of this important market. Single tasking could become an anachronism.

And if such systems can provide your computer with the right laxative to ease its I/O constipation, you are going to need equipment that allows you to keep up with the new, youthful, dynamic, healthy performance, which is where we came in. The mice, good idea that they are in theory, have got to prove that they are good in practice. They are going to have to work, well and reliably, despite coffee spills, being dropped, sat on or otherwise defiled.

Our cat soon got bored with its mouse, and it didn't live long enough to go for its first grease-up. END

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WARNIER ORR PROGRAMMING
PART 4: TECHNIQUES

Paul Overaa brings his programming series to a close by crystallising some of the ideas which are useful for designing and writing programs.

This month is the last in the current series and I want to conclude by generalising some of the thoughts of the last few months. By now you have seen some of the uses that Warnier diagrams may be put to, and I have tried to illustrate some of the ways in which such diagrams may be used to describe the structure of data and of programs themselves. The emphasis has been centred around the separation of the logical problems of programming from the physical problems of actually coding the solution for a particular language or a particular computer.

This approach relies on the fact that such solutions will not be restricted in practice by problems concerning, for example, the way data is stored, the order or the need for more than one arrangement of the data. Last month I looked at normalisation and the benefits that the third normal form has in terms of avoiding such restrictions.

I'm sure that some of you have, during the last few months, considered what happens if you make a logical error as you prepare a Warnier diagram. Such errors will sometimes occur but you will be less likely to make such mistakes because the diagrams represent your logical solution in a very 'pictorial' fashion. Frequently you will know that a fault exists just by looking at the diagram. You can then take steps to make the necessary modifications. Used in this way, the Warnier diagram becomes a 'prop' to lean on as you are working towards a solution.

It is possible to be more rigorous in the use of the concepts that we have looked at and, since there exists a relation between the defined objectives of a problem, the correct Warnier representation of the problem, and the efficiency of the final implementation, I thought it would be useful to consider one way to make sure your Warnier diagram is faultless.

Since the use of these diagrams for program design has been examined in earlier articles, I have up to now only reiterated those conventions that were actually needed for the discussions. Consequently, before examining further ideas it is necessary to explain some other conventions that are used.

If two or more options (subsets!) within a program are mutually exclusive, then they are written separated by a circle with a cross in it ⊕. Such a sign serves to indicate that only one of the options shown to the right will be performed. It is also conventional to show the logical opposite of a statement by placing a bar over the statement. Fig 1 shows a simple case.

We are describing a routine called CHECK SAMPLE NUMBER. If the check shows that the sample exists then the subset of actions called RETRIEVE RECORD is performed. If the check shows that the sample does not exist, then ERROR ROUTINE is performed. The options are mutually exclusive and only

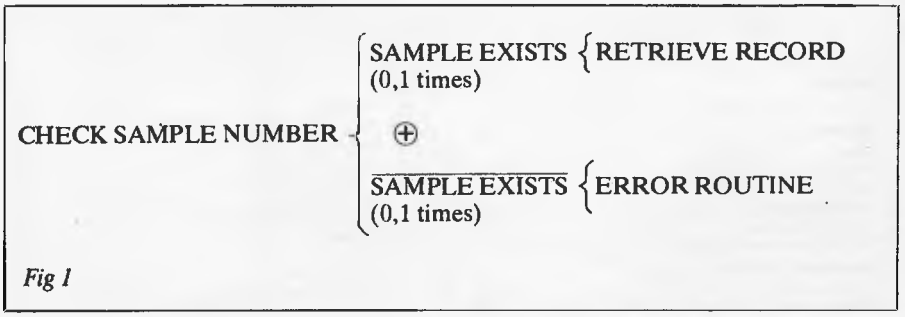

Fig 1

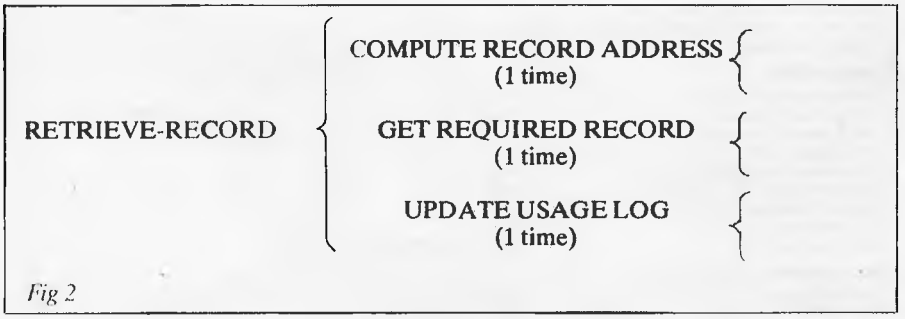

Fig 2

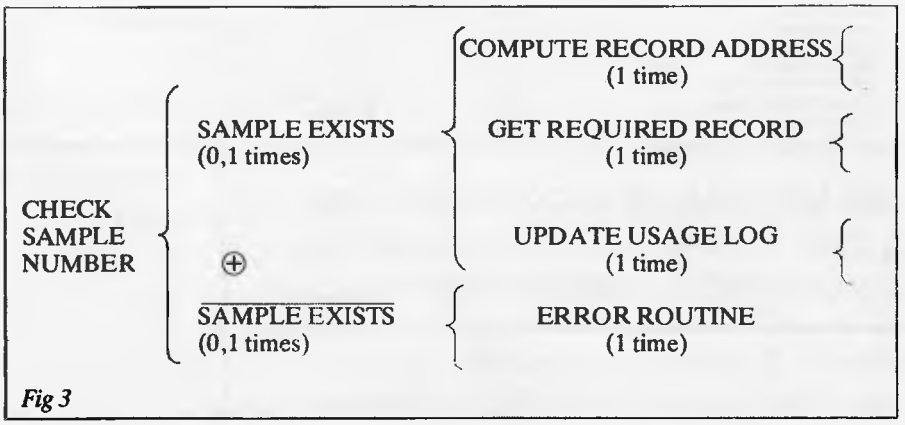

Fig 3

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one of the subsets would be performed at a particular time. These types of statements can be programmed using coding as is indicated in the following pseudo-code:

GOSUB "SAM-CHK"
IF SAM-CHK = O.K. THEN GOSUB "RETRIEVE-RECORD" ELSE GOSUB "ERROR"

The appropriate subroutine would be called according to the result of the check carried out on the sample number. The subroutine RETRIEVE-RECORD might consist of several parts. Firstly, the record address may be computed as a hash function of the sample number. Secondly, the record will be retrieved. Thirdly, a log might be updated to show that the record has been in use. All this can be shown as in Fig 2.

The combined description can be built up as shown in Fig 3:

In this way we use our practical requirements to build the Warnier diagram using the diagram as an iconic model of the logic we are attempting to describe or create. In doing this the Warnier diagram is actually mapping out the program structure required to implement our solution.

The building of a program design in this fashion is in most cases effective and results in programs that are logically well structured but . . . it is necessary to take care in the construction or your documented solution will be incorrect or inefficient.

Warnier does not concern himself with these aspects because the use of these diagrams as a design tool for analysing problems is not fundamental to his approach. Those of you that have studied any of Warnier's works will realise that to a large extent he attains a correct logical solution using various techniques including Boolean Algebra, Karnaugh Maps and Decision Tables. Such solutions are then represented by a Warnier diagram. The program is then constructed from the diagram as indicated.

I am, therefore, using the Warnier diagrams in a rather different way to that originally employed by Warnier himself, because I frequently use these diagrams to analyse and document my thoughts on a problem, ie, I am using the diagram as a design tool to provide an iconic model that helps me to achieve my solutions by a process of 'iterative refinement'.

It is sometimes helpful, when using the Warnier diagrams in this way, to be able to verify the efficiency and correctness of your implied solution. One way to do this is to translate the diagram into an algebraic expression using the Algebra of Sets, Boolean Algebra or any other isomorphic algebras with which you might be familiar. I will take a simple example and describe what is done at each stage. (In case you think all this comes easy to me I can assure you that it doesn't. The reason I persevere is that I can see immense practical benefits from being able to analyse a program structure with mathematical techniques like these.)

Let us take a very general example of a Warnier diagram and use the letters A, B and C to represent three conditional tests that are present in the structure of the program. Let us also define U1, U2, U3 and U4 as subsets of actions that are performed in accordance with the logical description shown in Fig 4.

There is nothing special about the example other than the fact that it was made purposely inefficient. You can regard U1, U2 . . . etc, as being subroutines that are called as desired. If, for instance, condition A is true and condition B is also true then the top third from left bracket will be performed. If in the course of carrying out the operations in this bracket the test C fails — ie, is not true — then subroutine U2 would be called. If the test C did not fail — ie, condition C was true — then subroutine U1 would be called instead.

We get a clue about verifying such a diagram from one of the ways that Warnier uses to solve his logic problems. At times he will get a solution from a decision table of possible options in terms of a Boolean Algebra expression. He would then procede to describe the solution with a Warnier diagram. The implication is straightforward . . . if you can convert a Boolean expression into a Warnier diagram then you can convert a Warnier diagram back into a Boolean expression. Having done that, you can manipulate the expression and reduce it to its simplest form (or confirm that it is already in its simplest form). It is then perfectly easy to take the simplified expression and convert it back to the Warnier diagram form. The resulting diagram will then be correct and will represent the simplified logical solution.

If you study Fig 4 you will see that subroutine U2 is called in two places. Firstly, if test A is true and test B is true but test C is not true then U2 will be called. Secondly, if test A is not true and test B is true and test C is not true, then again subroutine U2 will be called.

We can express the fact U2 is dependent on these two condition requirements in the following way: $U2 = A.B.\bar{C} + \bar{A}.B.\bar{C}$. This is a Boolean Algebra expression of the set of conditions under which subroutine U2 is called. We can, in a similar fashion, write down expressions for all of the subroutines U1 to U4. If we do this we get the following results:

$U1 = A.B.C + A.\bar{B}.C + \bar{A}.B.C. + \bar{A}.\bar{B}.C$
$U2 = A.B.\bar{C} + \bar{A}.B.\bar{C}$
$U3 = A.\bar{B}.\bar{C} + \bar{A}.\bar{B}.\bar{C}$
$U4 = \bar{A}.B.C + \bar{A}.B.C$

The notation is derived from Boolean Algebra but the way you describe the expressions in words is up to you. U2 can be described as the subroutine that is carried out when either 'A and B are true but C is not true', or 'B is true but A and C are not true'.

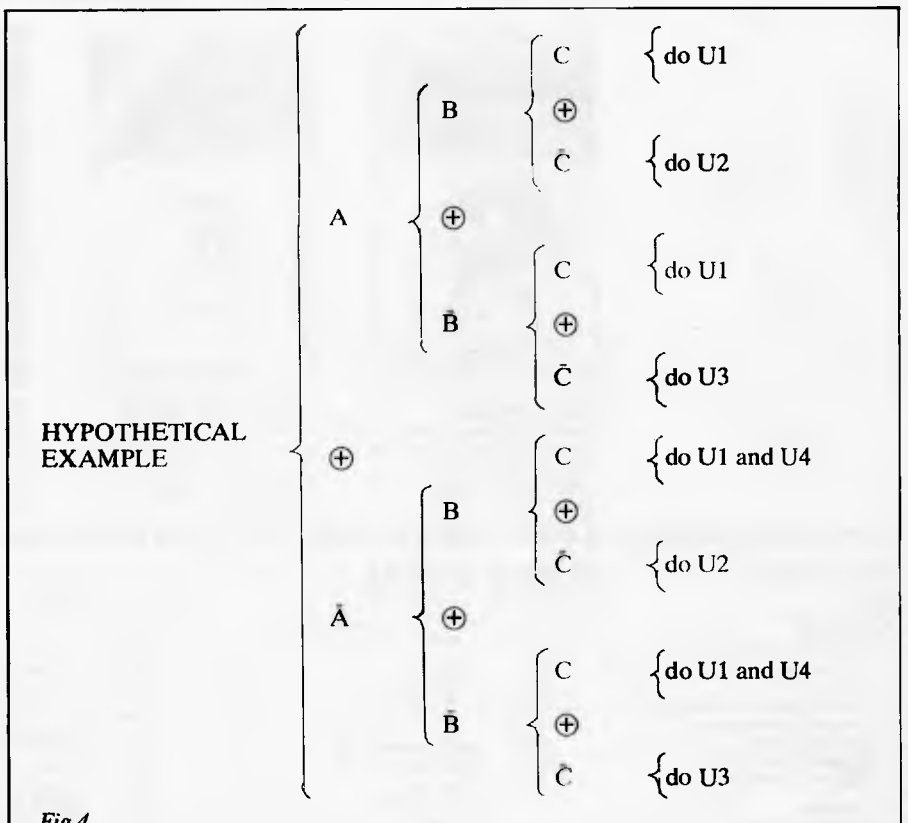

Fig 4

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To follow the reduction of the above expressions all you need to be aware of is the fact that you can treat the right hand side letters as you would treat unknowns in an equation. The object of the exercise is to regroup the symbols so that we can bracket together complementary terms such as A and $\bar{A}$ because we can then eliminate them.

Look first at U2 and follow through the reduction:

$U2 = A.B.\bar{C} + \bar{A}.B.\bar{C}$

First we note that $B.\bar{C}$ is common to both expressions and rearrange accordingly:

$U2 = B.\bar{C}\,(A + \bar{A})$

This immediately leads to the reduced expression for U2 as:

$U2 = B.\bar{C}$

Now we try to reduce U3 in a similar way:

$U3 = A.\bar{B}.\bar{C} + \bar{A}.\bar{B}.\bar{C}$
$U3 = \bar{B}.\bar{C}\,(A + \bar{A})$
$U3 = \bar{B}.\bar{C}$

With U4 we procede as follows:

$U4 = \bar{A}.B.C + \bar{A}.\bar{B}.C$
$U4 = \bar{A}.C\,(B + \bar{B})$
$U4 = \bar{A}.C$

Lastly we can reduce U1 in the following manner:

$U1 = A.B.C + A.\bar{B}.C + \bar{A}.B.C + \bar{A}.\bar{B}.C$
$U1 = A.C\,(B + \bar{B}) + \bar{A}.C\,(B + \bar{B})$
$U1 = A.C + \bar{A}.C$
$U1 = C\,(A + \bar{A})$
$U1 = C$

We have now simplified all of the original expressions and have obtained the following results:

$U1 = C$
$U2 = B.\bar{C}$
$U3 = \bar{B}.\bar{C}$
$U4 = \bar{A}.C$

How do we convert these expressions back into an efficient Warnier diagram? The first thing to do is to rearrange the expressions so that the most frequent condition test comes first on the right hand side. Then the next most frequent, and so on. If we do this we obtain the following:

$U1 = C$
$U4 = C.\bar{A}$
$U2 = \bar{C}.B$
$U3 = \bar{C}.\bar{B}$

Look closely at the way the reduced forms have been arranged and then look at the Warnier diagram in Fig 5. We can draw the diagram directly from the rearranged Boolean expressions.

You will notice that we have effected quite an improvement on the logical structure of our hypothetical program. If we consider some of our earlier thoughts we can see some useful concepts emerging. We can use Warnier diagrams to represent our problem pictorially as we come to terms with the various constraints and can create a 'picture' of our logical solution. We can also check the validity of a solution by translating the diagram into algebraic form and attempting to reduce the expressions we obtained. If we find reduction is possible then by translating back we can improve the original solution. The final Warnier diagram will describe the necessary structure of the program in a way that is easy to translate into computer code.

The correspondence between a Warnier diagram and Set Algebra or the isomorphic Boolean Algebra provides a link into realms of mathematics which, I should imagine, has several implications concerning the correctness of the structure of a program.

I promised last month to show you one last use of the Warnier techniques. As you know we can regard a program as a set of instructions. We can divide such a set into subsets and represent the inherent structure using a Warnier diagram. It is equally advantageous in systems design to consider the system as being divisible into subsets of actions. Such a subset defines a set of logically related actions that may be combined into a program module.

Imagine, for instance, that we are

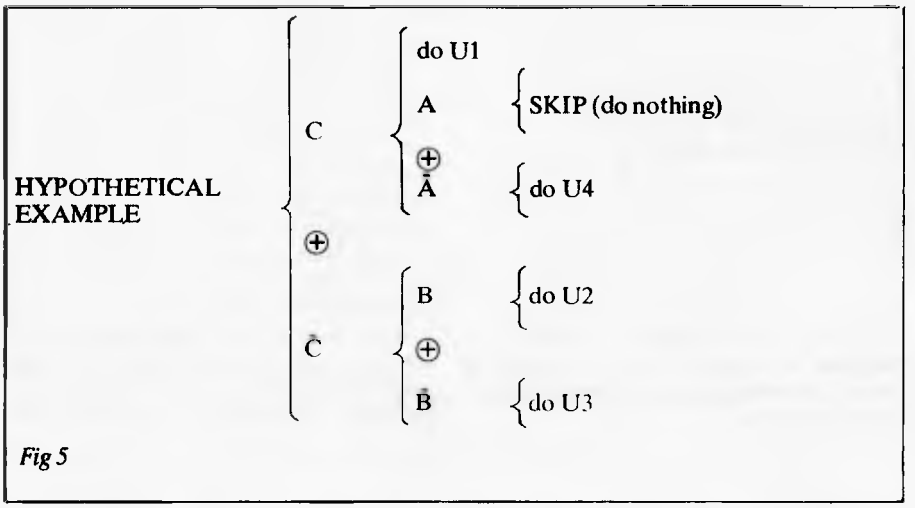

Fig 5

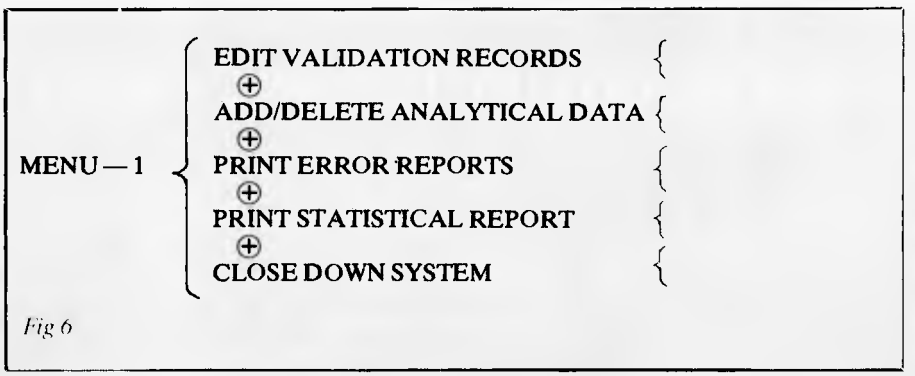

Fig 6

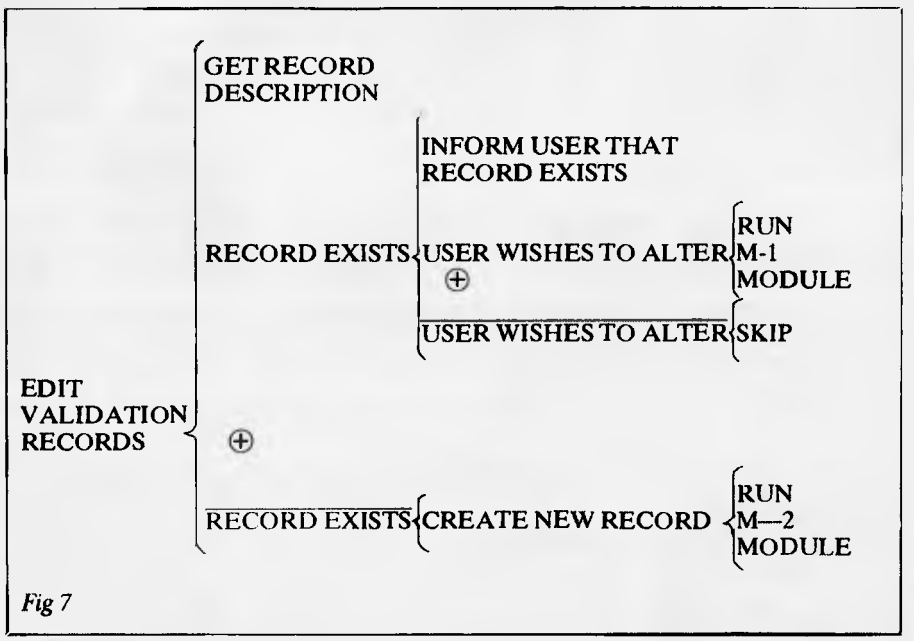

Fig 7

designing a system around the statistical analysis problem that we have been using during the last few months. In practice we would need to be able to add data, delete data, analyse it, print reports, and so on. We could decide on a menu driven system and could describe the highest level menu in Warnier form as in Fig 6. Here all options are mutually exclusive.

Such a diagram indicates the bare essentials of what we want our system to do. Each term can obviously be expanded into much greater detail. The simple statement in Fig 6 'EDIT VALIDATION RECORDS' can be expanded to incorporate some additional ideas as in Fig 7.

We can see, by using these ideas, that there is no fundamental difference between designing a system and designing a program. It is just as easy to develop a logical coherent system as it is to develop a logical program.

Conclusions

This brings me to the end of this particular series. I have tried to emphasise some new ideas that seem to me to be of practical use in our quest for better methods of writing and designing programs. There is no doubt in my mind that the work of Jean Dominique Warnier is of fundamental importance in this search. We dealt initially with some ideas connected with how we solve problems and the usefulness of having 'pictures' or 'iconic models' to relate to. We have also seen how the basic concepts of a set can provide interesting and useful descriptions of both programs and data. The use of the Warnier diagram to picture these descriptions and the ideas of working backwards from the output requirements was shown in Part 2. Part 3 covered Normalisation and showed one way in which we can make our data structures more flexible. In this last part I dealt briefly with one approach to verifying your solutions and have suggested that the design of systems or 'sets of programs' is really no different from designing programs themselves.

Obviously such ideas do not solve all problems, and many other useful techniques and approaches exist. My purpose was quite simply to consider some ideas that I find of use and show you the way that I use them. I hope that by keeping the examples and the ideas fairly basic I have not clouded the underlying concepts. If you are new to computing, then use the ideas that you have understood and concentrate on the underlying essentials. If you are not a beginner, you can be assured that the concepts I have covered may be taken much further. I hope that the ideas have provided 'food for thought'. Perhaps, like me, you will consider that the unity of some of the underlying concepts may indicate that it is no longer necessary to regard good programming as 'magic' or 'an art'. Good programming can be taught just as easily as we teach other subjects . . . providing we use the right techniques and ensure that the underlying fundamental ideas are understood. END

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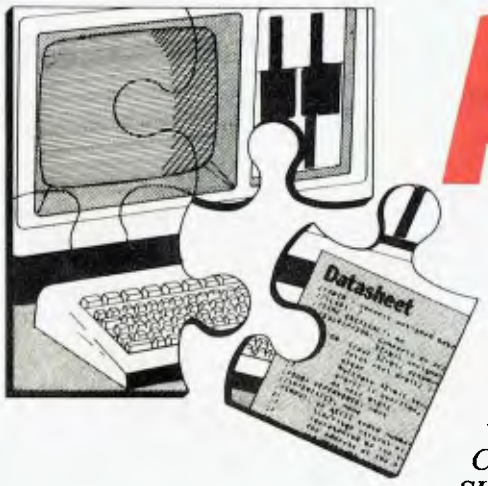

APC SUBSET

Alan Tootill and David Barrow present more useful assembler language subroutines. This is your chance to build a library of general-purpose routines, documented to the standards we have developed together in this series. You can contribute a Datasheet, improve or develop one already printed or translate the implementation of a good idea from one processor to another. APC will pay for those contributions that achieve Datasheet status. Contributions (for any of the popular processors) should be sent to SUB SET, APC, P.O. Box 298, Clayton, Vic 3168.

Mystery and Magic

Unusual for Sub Set, we stir the murky depths of Basic and sneak up on Communications in response to the following letter:

'I often look at the items in 'Sub Set' as I read through APC and wonder what one is supposed to do with them.

Now I've seen one or two items that look as though they could be of some use to me, I am moved to write to ask if some clue as to how to use these routines could be given — perhaps either as a supplement, or even a separate article. Or is the whole thing always to remain an esoteric mystery for the experts?

I have entered one or two Z80 machine routines in the form of REM statements and found they worked quite well on my TRS-80. Some of them are in decimal form, others in hexadecimal and I've never understood why.'

A McMillan

No mystery, Mr McMillan, but Sub Set is really for readers who have some understanding of machine code fundamentals. You would not expect to find Basic or Forth tutorials in the Programs section of *APC* and, similarly, we do not set out to teach machine code programming in Sub Set. However, if you do know something of machine code, the series gives you a marvellous opportunity to expand your knowledge and skill by working through the routines.

The considerable amount of documentation and comment in each Data Sheet is a valuable learning aid.

The stated aim of Sub Set is to publish machine code subroutines of general usefulness and with sufficient documentation to enable their use by people who do not know, or even want to know, how they work. But they are written to be used within, or called by, machine code programs and not as USR routines to be called from a Basic program. Not that it stops you adapting them for USR routines if that is what you require but you do need to know some machine code to be sure of success.

It is common in the case of Z80 routines for arguments, i.e. the values to be acted on, to be passed to and from the routines in registers. If these values are initially held in Basic variables then you have to POKE them into any free RAM before the USR command. You must then have a USR machine code routine that will PUSH the register contents on to stack and LD the values into the registers from where they are stored in memory before CALLing the particular subroutine in which you are interested. After RETurn from the subroutine, your routine will have to store the result values in RAM, POP the original register contents back into the registers from stack and RETurn to the Basic program. Use PEEK to get the results back into the variables.

REM statements are often used in Basic programs to provide space for machine code subroutines. Whether you type the numbers in as decimal or hexadecimal values, is not particularly important as long as you also include a section of Basic program to POKE these numbers into the correct RAM addresses. POKE usually uses decimal arguments so hexadecimal or any other numbering system would have to be converted to decimal before POKE.

6802 Block relocation

R Cath has sent RRL which uses a very efficient algorithm to move a block of memory to a lower address location, shifting the memory at that lower location up to fill the gap. In effect it is a rotation right by a variable number of places as shown in Fig 1.

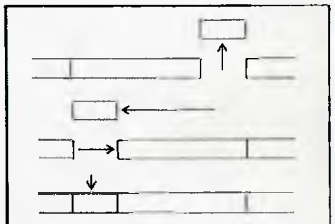

Fig 1.

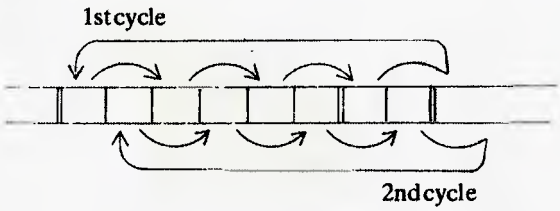

Fig 2.

To achieve the relocation by the three stages shown in Fig 1 would require the provision of a buffer large enough to hold all the bytes being shifted down. That would be very expensive in terms of memory usage, although probably the quickest way to do it. Instead, RRL works by performing a series of exchanges, illustrated in Fig 2, which may be a slower method but has the distinct advantage of only needing a one-byte buffer.

Each byte is, of course, moved by the number of bytes equal to the length of the block to be shifted down. When the pointer to the next exchange goes past the highest address being dealt with, it wraps around to continue again from the lowest address plus the amount of overflow. The process continues until the pointer gets back to the start address. However, this does not necessarily mean that all

the bytes have been moved. If the number of bytes in the block being moved down is a factor of the total number of bytes in the memory being processed, it becomes necessary to increment the pointer to a new start byte and go through another cycle. In Fig 2, two cycles are needed to complete the process. In fact it is the number of wraparounds that determines when all the bytes have been moved.

DATASHEET

```
;+ RRL - Rotate Right Long.
;/ CLASS:  2
;/ TIME CRITICAL?:  No
;/ DESCRIPTION:  Rotates a block of memory to the right (ie to
;/               higher addresses) by a given distance.
;/ ACTION: Initialise
;/          WHILE wraparounds <> 0 movelength
;/           start <- pointer
;/           (stack) <- (pointer)
;/           REPEAT
;/              REPEAT
;/                 (stack) <-> (pointer)
;/                 pointer <- pointer + movelength
;/                 UNTIL pointer > end of block
;/                 pointer <- pointer - blocklength
;/                 wraparounds <- wraparounds + 1
;/              UNTIL pointer = start
;/              (pointer) <- (stack)
;/              pointer <- pointer + 1
;/           ENDWHILE
;/ SUBr DEPENDENCE: None
;/ INTERFACES:  None
;/ INPUT:  M0,1 = Address of first byte of block to rotate.
;/         M2,3 = Address of block + 1.
;/         M4,5 = No. of bytes distance to rotate.
;/ OUTPUT:  Cy set:  Block rotated by (M4,5) places.
;/          Cy reset:  Invalid input, no rotation.
;/ REGs USED:  A X Y P M0 to M8
;/ STACK USE:  2
;/ LENGTH:  121
;/ PROCESSOR:  6502

RRL:    LDY $0          ;initialise Y for zero index          A0 00
        STY M6          ;and wraparounds to zero              84 ZZ
        STY M7          ;                                     84 ZZ
        LDA M0          ;and pointer to first byte in block   A5 ZZ
        STA M8          ;                                     85 ZZ
        LDA M1          ;                                     A5 ZZ
        STA M9          ;                                     85 ZZ
RRL1:   LDA M4          ;compare wraparounds with movelength  A5 ZZ
        CMP M6          ;                                     C5 ZZ
        BNE RRL2        ;                                     D0 08
        LDA M5          ;                                     A5 ZZ
        BMI RRL8        ;exitif negative movelength           30 57
        CMP M7          ;exit, process completed, if          C5 ZZ
        BEQ RRL9        ;wraparounds = movelength             F0 5B
RRL2:   LDA M8          ;save pointer start address           A5 ZZ
        STA MA          ;                                     85 ZZ
        STA MB          ;                                     85 ZZ
        LDA (M8),Y      ;move indexed byte to stack           B1 ZZ
        PHA             ;                                     48
RRL3:   LDA (M8),Y      ;exchange indexed byte with           B1 ZZ
        TAX             ;byte on stack                        AA
        PLA             ;                                     68
        STA (M8),Y      ;                                     91 ZZ
        TXA             ;                                     8A
        PHA             ;                                     48
        CLC             ;clear for addition                   18
        LDA M8          ;add movelenth to pointer             A5 ZZ
        ADC M4          ;                                     65 ZZ
        STA M8          ;                                     85 ZZ
        LDA M5          ;                                     A5 ZZ
        ADC M9          ;                                     65 ZZ
        BCS RRL7        ;exit if overflow occurs              B0 38
        STA M9          ;                                     85 ZZ
RRL4:   SEC             ;set for subtraction                  38
        LDA M8          ;get overshoot into A and X           A5 ZZ
        SBC M2          ;                                     E5 ZZ
        TAX             ;                                     AA
        LDA M9          ;                                     A5 ZZ
        SBC M3          ;iterating until pointer is           E5 ZZ
        BBC RRL3        ;past end of block                    90 DD
        INC M6          ;increment wraparounds                E6 ZZ
        BNE RRL5        ;                                     D0 02
        INC M7          ;                                     E6 ZZ
RRL5:   PHA             ;add overshoot to block start address 48
        TXA             ;for wraparound next pointer address  8A
        CLC             ;clear for addition                   18
        ADC M0          ;                                     65 ZZ
        STA M8          ;                                     85 ZZ
        PLA             ;                                     68
        ADC M1          ;                                     65 ZZ
        STA M9          ;exit if end of block is lower        85 ZZ
        BCS RRL7        ;than start of block                  B0 16
        CMP M8          ;repeat until pointer gets            C5 ZZ
        BNE RRL4        ;back to pointer start                D0 DC
        LDA M8          ;                                     A5 ZZ
        CMP MA          ;                                     C5 ZZ
        BNE RRL4        ;                                     D0 D6
        PLA             ;complete cycle by moving stacked     68
        STA (M8),Y      ;byte to pointer start location       91 ZZ
        INC M8          ;increment pointer ready for          E6 ZZ
        BNE RRL1        ;another cycle                        D0 9F
        INC M9          ;                                     E6 ZZ
        JMP RRL1        ;                                     4C YY YY
RRL7:   PLA             ;remove stacked byte and              68
RRL8:   CLC             ;reset Cy for exit showing            18
        RTS             ;invalid input.                       60
RRL9:   SEC             ;set Cy for exit showing              38
        RTS             ;process completed okay.              60
```

6809 Turnaround

Fire-breathing Mike Kerry, still in the vanguard of the 6809 invasion, demonstrates once again the superioity of that processor over the Z80 with his translation of John Hardman's MATRAN *(APC* August 1983).

MATRAN reconfigures a two-dimensional array or matrix which is stored column by column in linearly addressed memory into row by row storage. Or perhaps the other way about. Whichever it is, Mike has not provided us with any uses to which this transposition may be put — any suggestions? Neither has he come up with a method of performing the transposition within the original area of memory used by the source matrix, perhaps a similar method to that used by RRL?

DATASHEET

```
;+ MATRAN - Matrix Transposition, 6809 version.
;/ CLASS:  1
;/ TIME CRITICAL?:  No
;/ DESCRIPTION:  In-RAM move of a 2-dimensional array or matrix
;/               changing from row by row storage at source to
;/               column by column storage at destination or vice versa.
;/ ACTION:  For each column of Source
;/              save Source pointer
;/              For each row of source
;/                  Move element from Source to Destination and
;/                  Increment Destination pointer
;/                  Add No. of columns to Source pointer
;/              Restore Source pointer
;/              Increment Source pointer
;/ SUBr DEPENDENCE:  None.
;/ INYERFACES:  Source RAM or ROM.  Destination RAM same byte length
;/              as source.
;/ INPUT:  X = 1st byte of source matrix
;/         Y = 1st byte of destination RAM
;/         A - no. of source rows, B = no. of source columns.
;/ OUTPUT: Transpose of Source matrix at Destination.  All registers
;/         returned unaltered.
;/ REGs USED:  A B X Y
;/ STACK USE:  11
;/ LENGTH:  26
;/ TIME STATES:  (rows * 22 + 38) * cols + 26
;/ PROCESSOR:  6809

MATRAN:  PSHS  CC,D,X,Y      ;save registers.                  34 37
COLLP:   PSHS  D,X           ;counts and source pointer stacked 34 16
         LDB   6,S           ;get no. of cols from stack       E6 66
ROWLP:   LDA   ,X            ;move byte from source to dest.   A6 84
         STA   ,Y+           ;and increment destination pointer A7 A0
         ABX                 ;point next source row, same column 3A
         DEC                 ;repeat for all rows in           6A E4
         BNE   ROWLP         ;current column                   26 F7
         PULS  D,X           ;restore counts and source pointer 35 16
         LEAX  1,X           ;point to next column of source   30 01
         LDA   1,S           ;recover rows                     A6 61
         DECB                ;repeat for all                   5A
         BNE   COLLP         ;columns                          26 EA
         PULS  CC,D,X,Y,PC   ;restore registers and return.    35 B7
```

Z80 message assembler

If you have ever typed lots and lots of very similar messages in to your computer, you have probably cursed it for not being intelligent enough to generate its own messages from a database of basic words and phrases. That achievement would probably need quite a sophisticated artificial intelligence program so, until you get round to writing it, try making life a little easier by using MAKMSG. MAKMSG acts recursively to print messages composed of ASCII characters and also 'submessages' whose addresses are embedded in the higher level message preceded by a non-ASCII 'escape' byte.

DATASHEET

```
;+ MAKMSG - Message assemble and print routine.
;/ CLASS:  2
;/ TIME CRITICAL?:  Na
;/ DESCRIPTION:  Recursive procedure to assemble and print messages (at
```

```
;/              ASCII bytes and submessages.
;/ACTION:  IF character picked up is a null (0) THEN exit
;/            ELSE IF character is ASCII THEN print it and get next
;/                 ELSE pick up escape address and CALL MAKMSG.
;/SUBr DEPENDENCE:  'WRCHAR' - subroutine to print ASCII character in
;/                  A.  It must not corrupt HL.
;/INTERFACES:  None.
;/INPUT:  HL addresses first byte of message.
;/OUTPUT:  HL addresses null byte at end of message.
;/REGs USED:  HL A F
;/STACK USE:  0 + 4 * no. of sub-messages
;/LENGTH:  25
;/PROCESSOR:  Z80

MAKMSG:  LD    A,(HL)      ;get byte in A, test to see          7E
         OR    A           ;if it is a null and if so, exit     B7
         RET   Z           ;as end of current level reached     C8
         CP    80H         ;test for ASCII and                  FE 80
         JR    C,MKMSG1    ;branch if it is.  Else it is an     38 0C
         INC   HL          ;'escape' to a substring, so pick    23
         LD    A,(HL)      ;up substring address in HL from     7E
         INC   HL          ;next two bytes, saving this level   23
         PUSH  HL          ;address on stack for                E5
         LD    H,(HL)      ;continuation after return from      66
         LD    L,A         ;processing lower level              6F
         CALL  MAKMSG      ;recurse to print substring          CD YY YY
         POP   HL          ;restore this level pointer and      E1
         JR    MKMSG2      ;skip the printing this time.        18 03
MKMSG1:  CALL  WRCHAR      ;go print valid character            CD XX XX
MKMSG2:  INC   HL          ;point  to next byte and             23
         JR    MAKMSG      ;repeat till null byte found.        18 E7
```

The true worth of a routine such as MAKMSG can only be appreciated in an application which uses many similar messages but as an example we show how the system can be used to construct jargon phrases. Fig 3 gives the hex dump mixture of ASCII codes and 'escapes', written at an arbitrary address, followed by MAKMSG's decoding.

```
1234:  20  49  4E  46  4F  52  40  00
123C:  80  34  12  41  54  49  4F  4E
1244:  00  20  54  45  43  48  4E  00
124C:  80  45  12  49  43  41  4C  00
1254:  80  45  12  4F  4C  4F  47  00
125C:  80  54  12  80  4F  12  00  80
1264:  54  12  49  53  54  00  20  44
126C:  45  54  61  49  4C  00  80  5C
1274:  12  80  54  12  59  00  80  5C
127C:  12  80  63  12  00  80  4C  12
1284:  80  6A  12  00  80  6A  12  45
128C:  44  80  5C  12  00  80  5C  12
1294:  4C  59  80  34  12  45  44  00

1234:  INFORM
123E:  INFORMATION
1245:  TECHN
124C:  TECHNICAL
1254:  TECHNOLOG
125C:  TECHNOLOGICAL
1263:  TECHNOLOGIST
126A:  DETAIL
1272:  INFORMATION TECHNOLOGY
127F:  INFORMATION TECHNOLOGIST
1281:  TECHNICAL DETAIL
1288:  DETAILED INFORMATION
1291:  TECHNOLOGICALLY INFORMED
```

Fig 3

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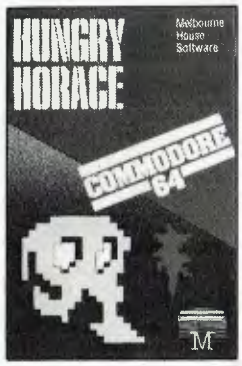

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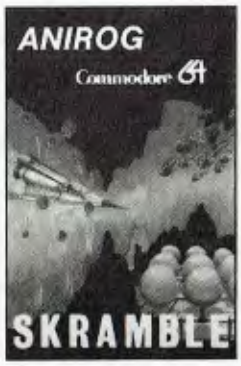

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Benchtests: Commodore 8032, SuperBrain/Overview of chess machines and micro programs/Writing machine independent Basic programs/Printer review/Programs: Lunar Lander (TRS-80), PET Fighter Pilot, Apple Plotting, LPrint to Print utility (TRS-80), ZX80 Breakout, Graph (TRS-80).

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Checkout:Super 80 hi-res board/Robotics discussed/Three micro tournaments reviewed/Computer Games: "Guessing the odds" in game programming/APC-80: First ever instalment/The Complete Pascal, Part 6: Records and Files/Speeding up TRS-80 pocket computer programs/Free format dialngues at the man-machine interface/Programs: TRS-80 Tarot, PET Bloobers, PEEK and POKE for Apple Pascal, PET Demolition, Superboard Bug Bypass, String Function (Microsoft Basic), Several Sorts (Microsoft Basic).

Volume 1 No 8, 1981
Benchtest: Atari 400 and 800/Beochmark timings for machines tested up to this issue/Developing a business program, Part 1/The Complete Pascal, Part 7: Procedures and Functions/Gateways to Logic, Part 3: How Computers Think/APC-80: single keyword entry/A look at a US company specialising in helping the handicapped/Formatted dialogues at the man-machine interface/Programs: Reading 'System' tapes into the System 80, Monster Multiplier (Apple II), Read-write routines without error (PET), Program formatter (for programs stored in ASCII).

Volume 1 No 9, 1981
Checkout: "The Last One" program generator/Multi-User Systems, Part 1: Introduction/Computer Games: Bluffing and psychology/Disks and disk drives explained/Recovering from a data tape disaster/Developing a business program,. Part 1/APC-80: String execution and block moves/Introduction to machine language/Gateways to Logic, Part 4: Binary arithmetic/Ultrafast tape storage for the Superboard/The Complete Pascal, Part 8: "Top-down" design of large scale text formatting programs/Review of the Forth language/Programs: TRS-80 Target Practice, TRS-80 Four in a Row, PET Anagram, PET Obstacle Course, Minefield (TRS-80).

Volume 1 No 12, 1981
Benchtest: Bigboard/Multi-user Benchtest: MVT Famos & WP Benchtest: Magic Wand/How printers work/Mainframe chess

programs/Gateways to Logic, Part 5.2: Electronic Logic/TRS-80 Tiny Basic Compiler/What's Where in OSI ROM/Profile: Nigel Shepherd of Commodore/ Building Parliament House with a micro/Solar System simulation/ "Quarter-box" graphics on a PET/Single Key Keyword entry for the Superboard II, Part 2 (end)/Programs: PERT Replace, TRS-80 Demon Hunts, PET Chords, ZX80 Sliding Letters.

Volume 2 No 2, 1981
HP-85 Reviewed/EDP at the Spastic Centre of NSW/TRS-80 Tiny Compiler on larger memory machines/APC-80: Bill Anderson of ADE/Facing the Future by Barry Jones/User-defined formatting on the Apple/ Improving the Superboard II/ PET utility for replicating cassette files/Relocating OSI Basic-in-ROM/Programs: Bigboard Real Time Clock, APC-80 Alien Invasion, PET Radio Technician Course.

(Stocks in limited supply.)

Volume 2 No 3, 1981
Checkout: Sinclair ZX81/APC-80: Recovering lost programs, JUMP command (allows a GOTO "numeric expression")/ Building a Bigboard/Keystroke reduction for EDTASM users/ Sanders Printer reviewed/Profile of BS Microcomp/CP/M explained by Rodnay Zaks/The rapid bubble sort for the Apple/ Encryption for any Microsoft Basic/An imagined 6502 "Dream Machine" specs/Vectors explained on the Challenger IP/ Programs: TRS-80 flashing cursor and non-destructive backspace, Treasure Hunt (PET).

Volume 2 No 4, 1981
Benchtest: VIC-20, Tandy TRS-80 III/TRS-80 Monitor software compared/Computer Games: Backgammon on micros/Tree access routines explained/Gateways to Logic, Part 8: Peripherals/How Computers Communicate, Part 1: What is I/O?/ Profile Gary Blom of the Computer Company/Part 1 of 2: Defining program specification needs/6502 Assembler in Basic/ Wordpower wordprocessor program for the PET/Programs: PET Arithmetic Test, Apple Mondrian.

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Volume 2 No 5, 1981
Benchtest: IBM Personal Computer, NEC PC8000/WP Benchtest: Spellbinder/Gate array design and firmware modules: an upcoming generation of chips/ Winchester hard disks explained by Rodnay Zaks/Computer Games: Poker on micros/Gateways to Logic, Part 9 (end): Typical teaching projects/ Artificial Intelligence/How Computers Communicate, Part 2: The I/O Bus/Storing alphanumeric records under CP/M/ Part 2 of 2: Defining program specification needs/Apple "booby trap" documented/Make PET disassembled programs more readable/Explaining the WAIT function for OSI and PET machines/Putting a bell tone onto the Superboard/Programs: TRS-80 Sailing Simulation, ZX80 Eldorado, PET Gomoku.

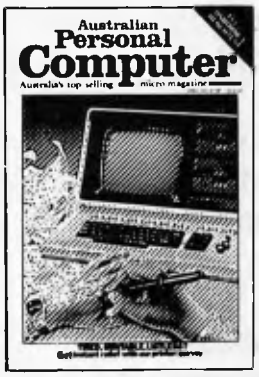
Volume 3 No1, 1982
Benchtest: Tandy TRS-80 Color/ Checkouts: Hitachi Peach, Sharp's Microtranslator, BBC Proton/Profile of Rodnay Zaks/ Sorting alphanumeric codes from disk to disk/Computer games:GO-MOKU on micros/ Generating Patterns with a computer, Part 3: The parallel interface/Review of Forth Language/A neat way to describe programs quickly and logically/ Speech Synthesis for the TRS-80s, System 80s, Part 1/Cassette utility for System 80 on Eprom/ An easy route to shape tables for the Apple/Rubik Cube Simulation for the Apple/How to implement "Turtle" graphics on an Apple/Programs: Get Simulation (Apple), Bug Bug (TRS-80), Cryptography (Microsoft Basic).

Volume 3 No 2, 1982
Checkout: Apple III/Fitting a smooth curve to complex data plots/Speech synthesis for TRS-80s, System 80s, Part 2/"Bridge" on micros/Relocating assembly language programs/Binary sort explained/Programmable rhythm generator project for PET/Large number calculations on micros/ Basic interpreters explained/ Checkout: ZX81 printer/APC-80 overview and debounce routine/Storing arrays on tape/ Frames of Reference, Part 1: A DP manager's guide to micros/ How Computers Communicate, Part 4: The IEEE interface/ Overview of micro-computer databases/Programs: TRS-80 Alien Seabattle.

Volume 3 No 3, 1982
Benchtest: Hewlett Packard HP-125/WP Benchtest: Scripsit 2.0/ Checkout: Dick Smith Votrax Type 'N Talk, The Australian Beginning/Videotext overview/ Frames of Reference, Part 2: Hardware and Software Suppliers/Profile: Jim Warren of the West Coast Computer Faire/How Computers Communicate Part 5: The BCD Interface/Installing hires on the TRS-80/Bridge playing program reviewed/Programs: Galacti-Cube (3D Maze in fairly "standard" Basic), PET Fantasy, ZX80 Labyrinth, PET Juggle.

Volume 3 No 4, 1982
Benchtests: Osborne 01, Micro Bee/APC-80: Command mode syntax error recovery/How Computers Communicate Part 6: The RS232 interface/80 x 24 display controller project/Preview of the Commodore 64/Atari 400 games reviewed/Profile: Adam Osborne/ ANS Basic's features/Solving the hidden surface problem in 3D graphics/Frames of Reference, Part 3: Micros in mainframe company/Hewlett Packard's networking capability/Programs: TRS-80 Reaction Timing, ZX81 Graphplot, PET Cheese, Superboard Spin-Fighter, TRS-80 Extra.

Volume 3 No 5, 1982
Benchtests: Texas Instruments TI 99/4A, Xerox 820/Database Benchtest: FMS-80/TRS-80 Model I games reviewed/Frames of Reference, Part 4: Software standards/How Computers Communicate, Part 7: Interrupts in micro systems/How to use 3D graphics/Equation solving program/80 x 24 display controller project, Part 2/"Logo" Overview/ Printer survey/Casio's calculator printer/Programs: TRS-80 Double Precision Maths and Trig, Apple 3D Maze,Atari Sums for Kids, Apple Air Flight.



Volume 3 No 6, 1982
Benchtests: Sinclair ZX Spectrum, Sirius I/Database Benchtest: dBase II/7th West Coast (micro-computer Faire)/ Checkout: F-10 Daisywheel printer, Arfon Expandaboard/ How Computers Communicate, Part 8: Direct memory access/ Frames of Reference, Part 5: Buying micro hardware in a DP department/Self learning program/80 x 24 display controller project, Part 3 (end)/How to get more on Apple disks/Lisp — an artificial intelligence language/ VIC-20 games reviewed/Implementing CP/M system calls from Microsoft Basic/APC Subset (first on new monthly column for assembler language routines)/ Programs: TRS-80 Invader, PET Mini-animate, VIC-20 Trailblazer, ZX81 Book Index, Weebug Monitor (TRS-80), VIC-20 Large Characters.

Volume 3 No 7, 1982
Benchtests: Sharp MZ80B, Monroe OC 8820/Checkout: Sharp PC1500, The Micro-Professor/Apple II games reviewed/APC-80: Various PEEKs and POKEs explained/ Reversing images on computer screens/Frames of Reference, Part 6: Putting your micro to work/How Computers Communicate, Part 9: Character codes/Educational arcade-type game/Programs: ZX81 Hypocycloids, TRS-80 Truth, PET Doc, TRS-80 Screen Dump, PET Boxes, Atari Earth.

Volume 3 No 8, 1982.
Benchtest: Sord M23/Checkout: TI-83, Sony SMC-70/NCC Show Report/Sirius Graphics/ Advanced graphics techniques/ UCSD p-System overview, Part 1/IBM PC users talk/Taxonomic classification on an Apple/How Computers Communicate, Part 10: The software of I/O/ Abbreviated execution version of APC-80/RS232 overview, Part 1/ Checkout: Apple II Screenwriter/ Programs: TRS-80 Quadrangle, PET Mopup, Randomization Tests (ZX81).

Volume 3, No 9, 1982
Benchtest: ICL Personal Computer/Checkout: E40(CP/M data compression utility) Daisywriter printer, HP 11C & 120 calculators/BBC micro graphics capability/Best of APC's cartoons/ How to use Benchmarks/Logo Program (Microsoft Basic) Computer generated textures/RS232 overview, Part 2/Memory-saving utility for Apple/How Computers Communicate. Part 11: Interrupts and buffers/Programs: Sytem 80 Extended Basic, Apple Trees, ZX81 Alphabetising, PET File Companion, PET German Game.

Volume 3 No 10, 1982
Benchtests: Hewlett Packard HP-86, National Panasonic JB3000/ Checkout: Sharp PC-1211/UCSD p-System overview, Part 3 (end)/ How to implement 3D graphics on a micro/CP/M-86 vs MS-DOS: Relative merits of these 16-bit operating systems discussed/ Designing your own database/ Monitor for TRS-80/System 80/ File searching method/"Laws of Form" — a novel form of logic/ How Computers Communicate, Part 12 (end)/Benchmarking high level languages/Programs: TRS-80 Cardshuffler, PET Knockout, PET Trains.

Volume 3 No 11, 1982
Benchtests: Hewlett Packard HP75C, Kaypro II, DEC Rainbow/Programs for the HP41C and Casio fx702p/Algebra checking program/More on MS-DOS vs CP/M-86/Predictions in the micro industry/Clock/ calendar card for the Apple II, Part 1/Benchmarks summary/ Programs: Apple II Piano Computer, Moon Module (Apple II, correction in Vol 4 No 1), Walls (Atari, correction in Vol 3 No 12).

Volume 3 No 12, 1982
Benchtests: Epson HX-20/Database Benchtest: Cardbox/Checkout: E.T. Atari game, 80 column cards/Comparison of micro databases/Intelligence test for computers/Apple II clock card, Part 2 (end)/ "Ada" language overview/Tiny printing on a Centronics 739/Arithmetic program for the Sharp PC1211/ Programs: TI 99/4A Teepee Textpro, PET Firebird, Atari Colour Selector.

Volume 4 No. 2, 1983
Benchtests: NEC Advanced Personal Computer, Commodore 64/Which Spreadsheet: Microsoft's Multiplan/Casio PB100 hand-held micro reviewed/ Screen-play: VIC-20 games under the spotlight/A visit to the Hanover computer faire/Checkout: Microsoft MS-DOS2/ Reliable Code: Programming tips/An introduction to the artificial intelligence program, LISP/Linking up a System 80 to a Tandy Linepringer/Programs: Bricklayer (CBM 4032), Escape Maze (Atari 400/800).

Volume 4 No 3, 1983
Benchtest: Corvus Concept, IBM 9000/Checkout: IBM PC vs Columbia MPC, IBM vs Hitachi Success/Visi-On and Apple's Lisa compared/Visi-On: Visicorp's new general purpose program/ CP/M '83: The first software product exhibition/Transforming unused RAM into pseudo disk drives/Pascal Benchmarks/ Eprom/RAM board for the TRS-80/System 80/Direct graphics entry for the TRS-80/System 80/ Networks: Part 2/The Consumer Electronics Show review in Las Vegas/Portable Computer World: Hexadecimal madness/Programs: Atari Animation.

Volume 4 No 4, 1983
Benchtest: Dick Smith VZ-200/ Spread Sheet evaluations: Part 1/ Checkout: 1st APC Show/A look at 'C'/Networks: Part 3/Building your family tree on a micro/Low-cost System 80 memory expansion/Micro users get the upper hand/Pascal Benchmarks explained/How dentists can use micros/Programs: PET Billy (correction in Vol 4 No 6 Bludners), ZX81 Molecular Weight. Adventure in 1k, TRS-80 Word Scrambler.

Volume 4 No. 5, 1983
Benchtests: NEC Advanced Personal Computer, Commodore 64/Which Spreadsheet: Microsoft's Multiplan/Casio PB100 hand-held micro reviewed/

Screen-play: VIC-20 games under the spotlight/A visit to the Hanover computer faire/Check-out: Microsoft MS-DOS2/ Reliable Code: Programming tips/An introduction to the artificial intelligence program, LISP/Linking up a System 80 to a Tandy Lineprinter/Programs: Bricklayer (CBM 4032), Escape Maze (Atari 400/800).

Volume 4 No. 6, 1983
Benchtest: Texas Instruments' Professional/Checkouts: Comx 35 home computer, NEC's Spinwriter daisywheel printer/ Multi-Tool Word wordprocessor from Microsoft/Occam Occult: futuristic new language/The world of creative cross-figures/ MicroBee games reviewed/Are micros a good idea?/Programs: Construction Worker (System 80, TRS-80), Chicken Little (Micro-Bee), PET Zombies, Spectrum Blaster, Commodore 64 Sprite editor.

Volume 4 No. 8, 1983
Benchtests: Apple Lisa, DOT/ Checkouts: Osborne Executive, Epson FX-80 printer/Consumer Electronics Show Report/Will the Computer be the next dominant species on Earth/Milton Bradley's chess computer that moves its own pieces/Choosing suitable disks for your computer/ Cryptography on a micro/ Warnier Orr structured pro-gramming, Part 1/How to use the six function keys on the PC1500/ Programs: ZX81 Least Squares, System 80 Loading tapes from an external cassette player, TRS-80/ System 80 Adventure program, Apple II Pascal menu generation.

Volume 4 No. 9, 1983
Benchtests: Sord M5/Checkout: Tandy Model 100, Lisawrite/ Screenplay: TI 99/4A games/ Steve Wozniak returns to Apple/ Choosing a home micro/Warnier Orr programming, Part 2/Graph plotting and curve fitting on the BBC Computer/Bemoaning the mechanical teller/Programs: VIC-20 Snake line, ZX81 Surround, Apple II Screenplay, PET Histogram.

Volume 4 No. 10, 1983
Benchtests: Archives PC/Home Computer Survey — 15 micros selling for less than $1000 checked out by Steve Withers in an exhaustive market survey/ Checkout: Simons Basic, T/Maker III — office tool for the IBM PC, Digital Research Personal Basic/Computerising Your Business — a light and practical guide/Beginners Guide to Basic Program Conversion/ Clever trick with TI Sprites/ Cocktail program/Warnier Orr programming, Part III/How portable is portable/Programs: Atari No-Trons, TRS-80/System 80 Multi-Maths, Apple Text Maker, VIC 20 Spider, Commodore 64 Sprite Clock.

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Sol Libes presents his monthly batch of juicy snippets from the Big Apple.

Random rumours

Apple is expected to introduce a new Disk Operating System for the Apple II early next year to be called ProDOS. It will be compatible with the DOS used on the Apple III, use a hierarchical file structure and allow the handling of much larger files and more disk capacity than the DOS 3.3, the current system used on the Apple II. Apple will provide a program to convert applications software from DOS 3.3 to ProDOS formats . . . There are also rumours that Apple is very close to launching the Macintosh, 68000 based system, with an expected base selling price of just under $2000, and that Apple's stripped-down version of the Apple II will be in the stores for Christmas and sell for $500 . . . There are rumours that Victor Technologies, producer of the Victor 9000 computer, will report a loss for the second quarter . . . Microsoft is expected shortly to release a whole range of new products. There will be a word processor for the IBM PC with Lisa-like graphics and using Microsoft's mouse; a user will be able to see up to 65 different fonts on the screen as well as print them out and it will work with all the popular spreadsheets and database programs. The new version of MS-DOS is expected this autumn and should have multi-processing capability. The company is also expected to introduce version 4 of its LISP interpreter greatly enhanced from the previous version. Also due is version 3.1 of Fortran with 8087 support; strangely IBM will stick with the old version. And lastly, Microsoft will lauch an ISV (Independent Software Vendor) program similar to that of Digital Research . . . At the time of going to press there are hot rumours that IBM will formally announce its $750 portable home computer in the near future. As reported in an earlier column it is expected to use the 80188 processor, have 128k of RAM, a 5.25in disk drive, no expandability and some proprietary chips to discourage look-alikes. It will run a stripped down PC-DOS and include word processor and spreadsheet software. IBM is also expected to announce another version of the PC with even more power than the XT with better graphics (improved resolution and sprites), a Lisa-like user interface and multi-user, multi-processing capability. It will probably use the Intel 80286 processor . . . Commodore is rumoured phasing out production of its popular VIC 20 low cost home computer and readying a replacement which will *not* be compatible with VIC 20 software. The Commodore 64 is expected to still have about another year's life left in it and then it will probably be phased out.

Home computer price war

Eight years ago Texas Instruments entered the calculator business driving Commodore out of the business and nearly forcing it into bankruptcy. TI furnished Commodore with the chips used in its calculators. Commodore learned its lesson . . . it bought a chip maker achieving control over all key components. Thus today Commodore's 6502 microprocessor is used in other makers' systems, such as the Apple and Atari machines. Commodore also learned that the key to the consumer market was to bring out repeated new products and to undercut competitors' prices. The result is that Commodore now has more than 30% of the consumer computer market and is the only consumer computer maker to turn in a profit for the past year. In fact it reported $28 million profit on $675 million sales; and it is shooting for $1 billion sales for this year, while TI, Atari and Mattel all reported huge losses.

Meanwhile TI is seeking to move its large inventory of TI-99/4A home computers and has dropped the price to $89 to match better the selling prices of the Commodore VIC 20 and Atari 400. All three are currently selling for between $69 and $79.

A stockholder has filed a suit against TI charging that they sold their 99/4A computer at prices lower than actual manufacturing cost in the expectation of selling profitable software and peripherals. TI disclosed that it laid off 750 workers at its personal computer manufacturing plants and there are rumours of more lay-offs to come as TI has cut back on production. It has been reported that TI sales have fallen by almost 20%. TI has also redesigned the 99/4 internally to lower the component count to reduce manufacturing cost, and also to prevent any but TI-built ROM cartridges from being used with the unit.

Mattel Electronics also reported that it will cut 260 workers, 15% of its workforce, due to a 19% decline in sales of its home computer. All the workers were white collar employees as the company's manufacturing is in the Far East.

Price discounting has also begun impacting the small business computer market. The Osborne I, which a year ago was selling for $1750, can now be purchased on sale for $1099 with a database program included. The KayPro, its leading competitor, is currently selling for $1450 with rumours that the price will drop to $1250 next month. And Apple Computer which has fought hard to maintain pricing on its Apple II computers no longer appears to be able to hold dealers in check. An Apple IIe system, complete with 64k RAM drive, and 80 column card, can now be had for $1492, over $500 below its list price . . . The Franklin equivalent system can be had for $1199. It appears that before the year is out these small business computers may sell for under $1000.

VisiOn — where are you?

VisiCorp first demoed its VisiOn front-end software for the IBM PC last November at the Comdex show with promises that first deliveries would be made by the following July. Well, that time has come and gone and it is still not here. VisiCorp has been pushing delivery back and back. It is now promising to release it to end-users in November.

In the meantime VisiCorp claims to be improving it and extending its features . . . of course how would we know since we have not had an opportunity to try it. The company claims that it now has VisiOn running on DEC, Wang, Xerox, Texas Instruments and Honeywell systems as well as the IBM PC.

VisiCorp also recently acquired Digital Solutions Inc, Cupertino CA, a developer of SNA software. This is expected to enable VisiCorp to integrate its current software better with

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mainframe software.

In the meantime several other software companies have announced that they plan to introduce 'Lisa-like' systems for the IBM PC. Quarterdeck Office Systems, Santa Monica CA and Schuchart Software Systems Inc, San Rafael CA, say they expect to have their multi-window products out this month. Quarterdeck's package, called 'DesQ' will sell for $395 compared to VisiOn which is expected to sell for over $1700.

Micro/ mainframe links

Many of the traditional mainframe software vendors are moving into the micro software market by supplying software that links microcomputers to software used on large mainframes. Applied Data Research Inc, NY and Cullinet Software, two old-time mainframe software suppliers, have disclosed that they are developing software to allow micro users to link to their software being run on large IBM mainframes. ADR has signed an agreement with VisiCorp to use VisiOn on the IBM PC customised to enable users to view and manipulate multiple items from their mainframe software on their own screens. This software includes databases, electronic mail, and development tool software. Cullinet is expected to provide a similar micro/mainframe link for both the Apple Lisa and the IBM PC.

IBM expands retail outlets

IBM is adding another 300 stores to its distribution organisation to bring its total up to 1100 stores. This means that more than almost half of the computer stores in the country will soon be carrying the IBM PC. Further, IBM is expected to double the number of IBM retail stores (called 'Product Centers') to close to 100 by this time next year. IBM has also begun an aggressive program of paying referral fees to independent software and system vendors who refer customers to IBM sales offices.

There is no doubt that IBM has become the most aggressive marketer of small business computers to appear on the personal computer scene. As reported last month it spends as much on advertising as all its leading competition combined and will soon have more outlets for its PC system than any of the competition.

Zilog announces 32-bit micro

Zilog has announced its 32-bit microprocessor called the 'Z80,000', or Z80k for short. Rumoured previously in this column, its specs live up to predictions. It will be upward compatible (at binary level) with the Z8000 16-bit unit and will provide features for multi-user, multi-processor operation. It will run at clock speeds as high as 25MHz, have a 256 byte instruction cache and execute instructions in 2.2 cycles on average.

On paper it sounds like the most powerful microprocessor announced yet. Of course Motorla and Intel have not yet offically released the specs for their 32-bitters and it is likely that both will start shipping samples of their units before the Zilog promised 2nd quarter of 1984. National has also released the specs for the 16032 32-bit microprocessor and can be expected to start sampling before Zilog.

In any event, we can expect to begin seeing computers

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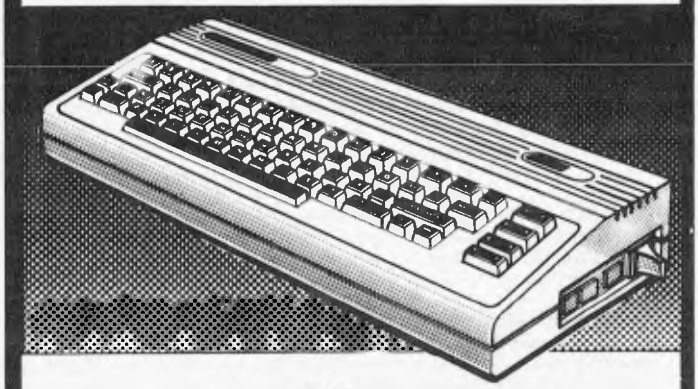

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based on these 32-bit chips being introduced by mid 1985.

Vendors try tele distribution

An experiment is being run by a few of the smaller software suppliers to download software to retailers, and in some cases to end users, via modem phone line connections. The expectation is to reduce inventory and to by-pass the problems of manufacturing and distributing thousands of floppy disks with the problems of returns, updates and lack of shelf space. It is the smaller software developers, who do not have access to good distributors who are trying this. With the newer, personal computer systems including modems and programs for transferring software teledistribution of software is expected to have a significant impact in the late '80s . . . particularly in the distribution of computer game software.

In the law courts

Computerland has filed suit against Microland Computer Corp, Newark CA, claiming infringement on its trademark name and advertising logo. This is the second such suit Computerland has filed. It lost the first suit.

MicroPro International nas filed a $10 million copyright infringement suit against United Computer Corp, Culver City CA by renting MicroPro software. MicroPro has charged that UCC removed the MicroPro customer agreement from its software packages and substituted one of its own, and that this encouraged copying of the programs. UCC has been renting programs such as WordStar and VisiCalc for 15% of their retail price for a ten-day period. There is also a $125 (business software) or $50 (entertainment software) initial membership fee.

Western Electric enters software market

Western Electric has introduced its first two software application packages. As expected they run under the UNIX operating system. WE's only previous activity was to license the UNIX operating systems to OEMs. Now WE is expected to be an important force in the UNIX software market-place.

The two packages are: UNIX Writer's Workbench and UNIX Instructional Workbench. They run under UNIX System V. The first program is a word processor selling for $4000 for the first CPU and $1600 for additional CPUs. The second package is a WP for novice users and is priced at $2500.

Random news bits

IBM formally made public its Local Area Network scheme at a recent meeting of the IEEE LAN committee meeting. IBM will license the technology for a mere $2000 one time charge . . . Intel seems to be having design problems with its new 80186 microprocessor which will delay introduction of about 500 products now in design. The part which is about 50% faster than the 8086 integrates the functions of the 8086 and several support chips and is rumoured scheduled for one of IBM's new personal computer products. Intel has been sampling it for several months now but production quantities are not expected to be available until next year. END

SOME COMPUTERS ARE BETTER THAN OTHERS

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EXPANDABLE TO	96K	96K	N/A	42K	N/A	64K	N/A	N/A
BUILT-IN EXTENDED MICROSOFT® BASIC	YES	YES	YES	ADDITIONAL COST	NO	NO	YES	NO
BUILT-IN RAM	80K*.	32K***	64K	48K	64K	32K	32K	16K
EXPANDABLE TO	256K**	256K**	64K	NO	N/A	32K	64K	48K
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NUMBER OF KEYS	87	71	63	61	66	73	53	40
USER DEFINE FUNCTIONS	10	NO	N/A	4	8	10	N/A	N/A
SPECIAL WORD PROCESSING	YES	YES	NO	NO	NO	NO	NO	NO
GENERATED GRAPHICS (FROM KEYBOARD)	YES	YES	NO	YES	YES	YES	YES	YES
UPPER/LOWER CASE	YES	YES	YES	YES	YES	YES	YES	YES
GAME/AUDIO FEATURES								
SEPARATE CARTRIDGE SLOTS	YES	YES	NO	YES	NO	NO	YES	NO
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COLORS	16	16	15	128	16	16	9	8
RESOLUTION (PIXELS)	256x192	256x192	280x160	320x192	320x200	256x640	256x192	256x192
SPRITES	32	32	N/A	4	8	?	16	?
SOUND CHANNELS	3	3	1	4	3	1	3	?
OCTAVES PER CHANNEL	8	8	4	4	9	3	5	3
A.D.S.R. ENVELOPE	YES	YES	NO	NO	YES	YES	NO	NO
PERIPHERAL SPECIFICATIONS								
CASSETTE	2 CHANNEL	2 CHANNEL	1 CHANNEL	2 CHANNEL	1 CHANNEL	2 CHANNEL	?	?
AUDIO I/O	YES	YES	NO	YES	NO	?	?	?
BUILT IN MIC	YES	YES	NO	NO	NO	NO	NO	NO
DISK DRIVE CAPACITY (LOW PROFILE)	256K YES	256K YES	143K NO	92K NO	170K NO	100K NO	? NO	? NO
CP/M® COMPATIBILITY (Standard 80 column CP/M 2.2 programs)	YES	YES	NO****	NO	NO*****	YES	NO	NO
CP/M C	YES	YES	NO	NO	NO	NO	NO	NO

Specifications are subject to change without prior notice.

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* 64K user addressable plus 16K graphic support
** 240K user addressable plus 16K graphic support
*** 16K user addrassable plus 16K graphic support
**** Apple II can accept modified 40 or 80 Column CP/M
***** Commodore 64 accepts 40 column CP/M
? Data not available

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ABUNDANT, DEFICIENT AND PERFECT NUMBERS... ALIQUOT SEQUENCES.

New readers start here. The topics dealt with in this column attempt to reach the frontiers of knowledge in number theory with the minimal background information. The problems posed therefore have no complete solution known to the author, and readers are encouraged to submit their attempts at solution, however incomplete they may seem.

A proper divisor of an integer n is any positive integer divisor of n except n itself. f(n) denotes the sum of the proper divisors of n, and $f_k(n)$ denotes the sum of the k^{th} powers of these divisors — eg, f(6) = 1+2+3=6, f(15) = 1+3+5=9.

The divisors of an integer n consist of the proper divisors of n, defined above, together with n itself. σ (n) denotes the sum of the divisors of n, and $\sigma_k(n)$ denotes the sum of the k^{th} powers of these divisors. Thus σ (n) = f(n) + n, while $\sigma_k(n) = f_k(n) + n^k$.

n is Perfect if and only if σ (n) + 2n, *viz*, f(n) = n.

n is Abundant if and if only σ (n) > 2n.

nn is Deficient if and only if σ (n) < 2n.

eg, 6, 28, and 496 are perfect since:

1+2+3+6 = 2.6 = 12; 1+2+4+7+14+28 = 2.28 = 56;

1+2+4+8+16+31+62+124+248 = 2.248 = 496.

Since some numbers are known to be abundant and some deficient, it is natural to ask what happens when we iterate the function f(n) to produce an Aliquot Sequence $\{f^m(n)\}$ m = 1,2, . . . where by iteration we mean repeated application of the function, eg $f^3(15) = f(f(f(15))) = f(f(9)) = f(4)=3$.

Now E Catalan Bull, Soc Math France 16 (1887-88) pp128-129, conjectured that the iteration is either periodic or stops at the number 1.

There now exists a heuristic argument together with much experimental evidence to suggest that some sequences, perhaps almost all of those with n even, are of infinite length.

P Poulet has calculated that for n=936 we obtain the sequence 936, 1794, 2238, 2250, . . . 74, 40, 50, 43, 1 containing 189 terms, the greatest of which has 15 digits.

The smallest n for which the behaviour was in doubt was 138 but D H Lehmer eventually showed that, after reaching a maximum of $f^{117}(138) = 179931895322 = 2.61.929.1587569$, the sequence terminated at $f^{177}(138) = 1$.

The next value for which there continues to be real doubt is 276 $f^{469}(276)$ = 1493848465982548442439056959926514129185564 0 reported to 3rd Conf Numerical Math Winnipeg 1973 by R K Guy, D H Lehmer, J L Selfridge and M C Wunderlich.

Problem

Submit a program, or suite of programs, to determine if a given integer is perfect, abundant or deficient . . . check that there are 23 odd abundant numbers less than 10,000 . . . use the same routine to iterate either the f(n) or σ (n) function and display the resulting sequences in the most useful manner to shed light upon the Catalan Conjecture.

All submissions should include program listings, hardware descriptions, run times and output; they will be judged for accuracy, originality and efficiency (not necessarily in that order). A suitable prize will be awarded to the 'best' entry received.

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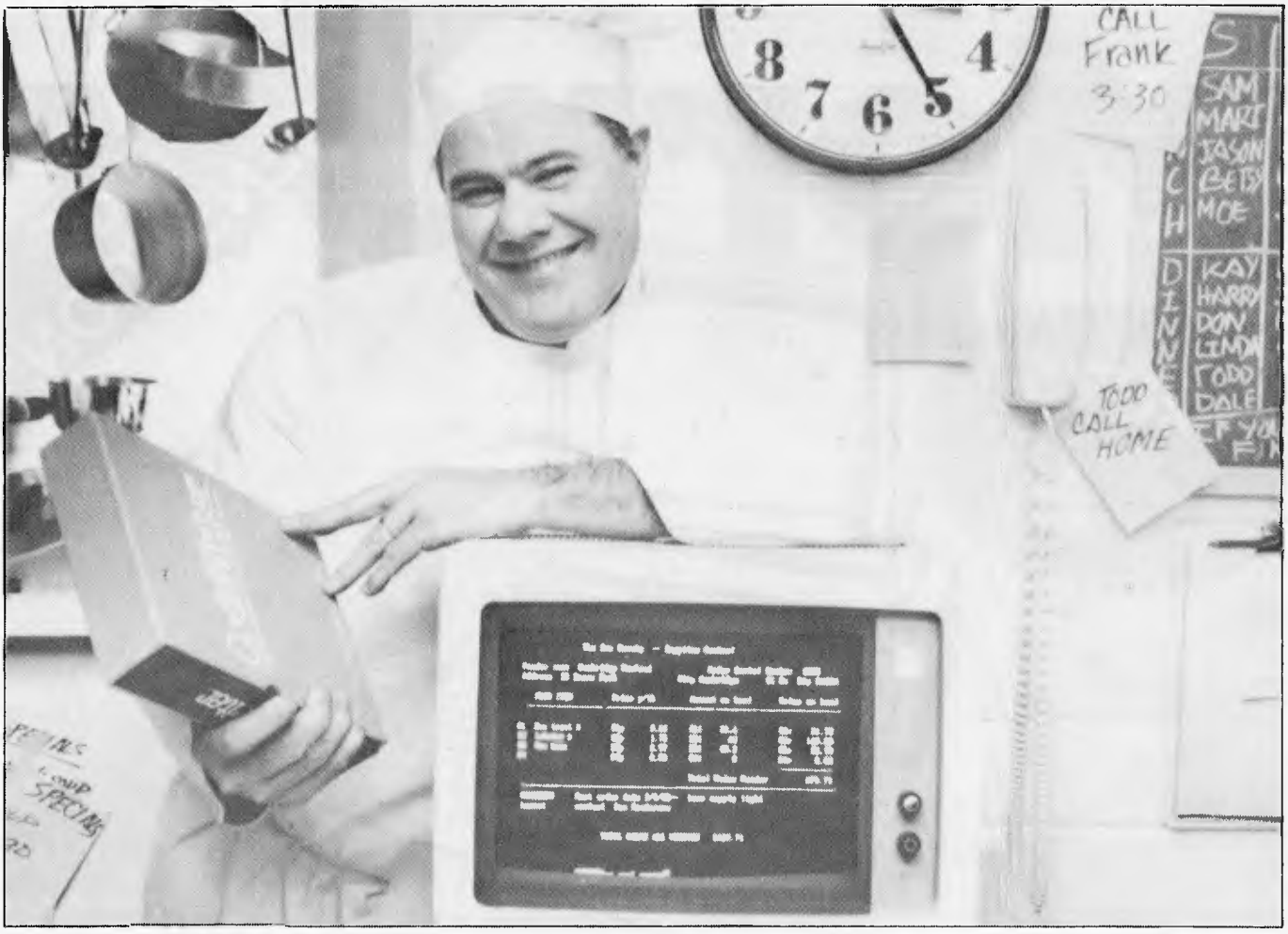

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SOFTWARE

WHICH SPREADSHEET?

PERFECT CALC

Mike Liardet finds out if 'Perfect Calc', as a spreadsheet package for both CP/M systems and, more recently the IBM PC, really does live up to its name.

Perfect Software Inc has recently set up in Australia to support its range of business software products. These include what the Americans term 'the big three' applications: word-processing, database and spreadsheet. But can this Californian company, distinguished by being based *not* in Silicon Valley but over the Bay in Berkeley, actually come up with the perfection it so proudly proclaims?

Getting started

Initial impressions of Perfect Calc are very favourable. It comes as a shrink-wrapped manual, slightly larger than a paperback, with disks and quick-reference card enclosed. Tearing off the wrapping reveals 350 pages of documentation, liberally illustrated, nicely laid out and easy to read — at least this is the impression from a first brief glance.

The system is available for both CP/M systems and the IBM Personal Computer. This review was done on an Apple II (with CP/M and 80-column display enhancements), and was accordingly on three separate disks.

Opening the manual at page one, where I always like to see 'getting started' instructions, I was instantly treated to an 'overview'. This consists of several pages of advertising copy for Perfect Calc, but it contains, on the very last line, the vital reference to installation instructions. For some obscure reason Perfect Software has buried this essential information in an appendix.

Quickly finding the right page, I was disappointed to discover very little information: a bare nine pages, actually less content than the overview. Any problems Perfect Software might have had, with documenting the system for two operating systems, have been neatly side-stepped by giving very scant information on either. The 'create working disk' section is liberally peppered with 'use appropriate utility' instructions — not a great deal of help to the newcomer.

The rest of the appendix comprises instructions for using the Perfect Calc configuration program which actually embeds information on your VDU or printer. Until this is done the Perfect Calc program will not work at all. As it happens, the Apple II versions of Perfect Calc come preconfigured, so there is not a great deal of work here, except that the Apple has a slightly non-standard keyboard, and this fact was not taken into account in the preconfigured version.

The configuration program should permit problems with keyboards, etc, to be sorted out, but in this instance it actually failed to do so. For example, the control-A key stroke, taken by Perfect Calc as the signal to move the cursor to the start of a row, cannot be generated on the Apple. (Push the 'control' and 'A' keys on the Apple and nothing happens — it actually has a 'local' function as a lower case/upper case switch.) Now the configuration program does permit the predefined conventions on keystrokes to be changed. You press the keystroke as it currently is, then the keystroke as you want it to be. Unfortunately the control-A keystroke is just as invisible to the configuration program as it is to Perfect Calc, so you are unable to specify what it is you want to redefine! Anyway, the problem can eventually be solved by resorting to Apple CP/M's 'CONFIGIO' facility, but not without some false starts and difficulties — so watch out Apple owners and anyone else with a non-standard keyboard!

Simple facilities

Once over the various installation 'hurdles' we are ready to get started properly. Simply key-in 'PC' in response to the operating system prompt and you enter the world of Perfect Calc.

After a few seconds of disk reading, the screen clears and a fairly typical spreadsheet display materialises: columns headed with letters of the alphabet and the rows prefixed with numbers.

In the standard configuration, the cursor is moved around by using four different keystrokes: 'control' and 'F' for forward a column, . . . and 'B' for backward, . . . and 'N' for next row, . . . and 'P' for previous row. Unlike most spreadsheet systems the keystrokes for these fundamental operations are not arranged in a diamond-pattern, but scattered over the keyboard. Of course, the choice of keystrokes is based on a mnemonic name and not the relative direction of movement. Personally I prefer the diamond arrangement, which can be touch-typed even by a novice, but in fact anyone who objects to the arrangement can readily change it by using the configuration program. A word of warning: the manual is written exclusively using the standard keystrokes, so it is obviously preferable to leave things as they are until complete mastery of the system is achieved!

Another peculiarity with regard to keystrokes: sometimes a double keystroke is needed, for example 'escape' then 'V' (two separate keystrokes) jumps the cursor right by several columns, whereas 'control' and 'V' (simultaneous push on both keys) jumps it down by several rows. In fact, many of the row operations use 'control and-' strokes, and their column equivalents use 'escape then-', both with the same letter.

In case I am confusing the newcomer let me digress a little, on what I shall pompously entitle: 'the subject of keystrokes ergonomics, and why it is worthy of

such attention.'

Firstly, computer keyboards are very like typewriter keyboards, but have one or two extra keys labelled such things as 'ESC' and 'CTRL'. Now nearly every key on the keyboard causes a code to be transmitted to the computer. Two exceptions to this are the 'CTRL' and 'SHIFT' keys (but note — not 'ESC'). If you push either of these keys on their own then no code is transmitted and nothing happens. However, if you use them in conjunction with some of the other keys, notably the letters, (correct way is to hold down 'CTRL'/'SHIFT', then push other key), then a modified key is transmitted — the upper case version of the letter if it is 'SHIFT'ed and a'control-code' if it is 'CTRL'ed. (The 'ESC' key is different from anything else since it generates a control-code, but without any help from 'CTRL'.)

Since a control-character has a completely different code from any other visible character, some computer packages, particularly highly interactive word-processors and spreadsheets, use them for 'control'. Ordinary keystrokes are generally treated as basic text or numeric entry, and control keys perform the special functions such as cursor moves or deletions.

With well thought-out packages the control keys can be quickly learned and easily used: the fewer the number of keystrokes needed to perform a particular function, the easier to remember and the quicker to use. When you are confronted with a keyboard for the first time this speed factor may seem irrelevant, as irrelevant as a hyper-fast gear stick when you are learning to drive. But after a while you start to get frustrated by packages where you can never find overdrive, or even worse — those that slip into reverse at 100kph! End of today's seminar!

By moving the cursor to the required position and then simply typing away, it is very simple to enter numbers and text into the spreadsheet. Formulae must be preceded by an '=' keystroke. If you forget to press '=' then Perfect Calc will assume you are entering either text or a number, a minor irritation until you eventually start remembering to use it.

It is possible to jump the cursor around the spreadsheet in various ways. There are keystrokes for jumping back/forward several rows/columns at a time, and also for jumping to the first and last entries in a row or column. Jumping to the first entry in a row is achieved by the infamous control-A mentioned earlier, and it is possible to jump the cursor to any named cell.

In general, I found Perfect Calc's keystrokes quite confusing and difficult to remember. Apart from the basic move keystrokes — up, down, left and right — which are based on mnemonics, there would seem to be no rationale for the keystrokes whatsoever, and there is no simple short cut to remembering what does what. One of the touted features of Perfect Calc is that its 'command structure is identical . . . to Perfect Writer', the word processor from the same stable, so at least, once learned, the keystrokes will also apply to one of Perfect Software's other packages. While being all in favour of standardisation, I must say that this is certainly one standard that should not be widely adopted!

Perfect Calc formulae have the usual sort of syntax used by many spreadsheet systems. One source of confusion stems from the fact that it uses both upper and lower case letters to identify different columns. Thus cell 'A1' is actually 26 cells along from cell 'a1'. You have to be careful with your use of the shift key with perfecT calC! Actually a similar problem is encountered with certain command sequences, for example, 'escape then y' is recognised, but 'escape then Y' is not. This sounds trivial, but it is fairly easy to get confused if your VDU has a shift-lock and commands stop working because you are accidentally locked in upper case.

Perfect Calc has a fairly extensive library of maths, or what it calls 'math', functions including logs and trig. There is also an

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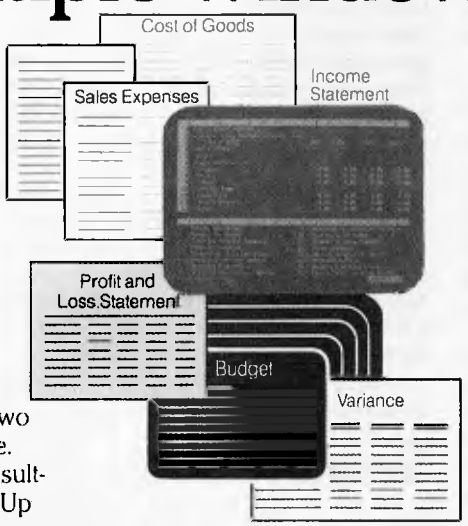

How Perfect Calc's™ multiple file association really pays off.

A good example is the built-in Income Statement Program. The income spreadsheet automatically reads from three other spreadsheets: Cost of Goods Statement, General and Administrative Expenses Statement, and Sales Expenses. All four are on-line simultaneously. All you do is fill in the blanks.

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intriguing reference in the aforementioned 'overview'. It evidently has a 'user extendable functions library'. Evidently you can 'add your own functions to the system, or even modify the existing ones'. Unfortunately this is the only reference to the facility that I can find in the entire manual. It would certainly be a very powerful feature it it does exist. Or possibly it is just a slightly over-excited description of the multiple spreadsheets (see below).

As with most spreadsheet systems, Perfect Calc has a replication facility, although it handles replication very much in its own unique way. Used in the simplest way, a single formula can be copied across a row or down a column, but it can also be copied into an area (and it is also possible to copy more than one formula at a time).

First the formula to be replicated must be placed into a 'save-buffer'. This is achieved by a single keystroke, once the cursor is located over the cell with the formula.

Incidentally, this buffer also receives any information that may be deleted, so the information is not lost immediately and a deletion in-error can be recovered — quite a nice touch. Once the formula is in the save-buffer, the area to receive the replications must be marked out. A mark is set in the top left hand corner of the area (two keystrokes) and the cursor then moved to the bottom right hand corner. Of course, single columns and rows are just a special case, where top left hand corner and bottom right hand corner happen to lie in the same row or column. It is slightly irritating that the marked cell is not highlighted in any special way, so you just have to remember where it is. Anyway, two more keystrokes, and Perfect Calc asks whether the cell references in the formula are to be changed in a relative or absolute fashion. This is the usual facility that permits a formula, say, constructed for January, to change slightly in its February to December copies, so that the copies act on February to December data as appropriate.

Perfect Calc has fairly powerful formatting facilities: column widths can be individually or globally varied, and there are a variety of numeric formats, including scientific, financial (with commas every three digits) and even a crude 'graphics' facility which is just about capable of handling bar charts. It is also useful to be able to see the formula for all cells *in situ*. Normally, only the formula for the current cell can be seen, displayed on the status line. Perfect Calc provides an option for this. Figs 1 and 2 give snapshots of the screen showing some of these features.

Finally, the simple Perfect Calc features include the ability to printout the spreadsheet. Printing can be to disk, for inclusion in a word processor document, for example, or as normal, to a printer. Pagination and breaks to deal with reports too wide for the printer stationery can all be handled automatically.

Advanced features

The wide range of advanced facilities in Perfect Calc provides a major incentive for using it. Of course, it is possible to do most of the usual formula replications such as row insertion and deletion — all of these facilities are commonly available in most of its rival spreadsheet systems. But there are also some highly sophisticated facilities noticeably absent from its rivals. Regrettably, some of these facilities are marred by confusing documentation and program bugs. It is to be hoped that Perfect

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Software will quickly rectify these problems, since they are all that stand in the way of it being a very advanced system indeed.

Virtual memory

When Perfect Calc is running on a CP/M system with 64k of RAM only 20k of RAM is actually available for the storage of the spreadsheet itself. The remaining 44k is reserved for the CP/M operating system, and the Perfect Calc software. In fact, Perfect Calc provides 64k of space for storing the spreadsheet: 20k in RAM and 44k on disk. Perfect Calc organises this 'invisibly', and as far as the user is concerned all 64k might as well be in RAM.

Well, almost! In fact, the 'virtual memory' facility causes a great deal of reading and writing to disk, and this slows everything down considerably. For example, there can be a few seconds delay, to get the data into RAM, after jumping to a new area of the spreadsheet. Global recalculations also take much longer since all disk data has to be read into RAM before it can be recalculated. But the effects of all this are not noticeable until the 20k limit is exceeded; that is everything happens in RAM up until that limit is exceeded. Moreover, automatic recalculation can be switched off or confined to selected areas of the spreadsheet, so it is possible to have some control over the longer delays.

Although the manual does not mention it, the virtual memory facility would run considerably faster if used in conjunction with a 'silicon disk'. A silicon disk is actually a spare RAM board inserted in the computer and not normally accessible to programs. But it is possible to buy special software that fools a CP/M program into thinking that it is a disk drive — hence 'silicon disk'. It behaves exactly like a real disk in every respect, except speed. Data from a silicon disk should be available virtually instantaneously, whereas real disks take time to build up speed, move disk heads and actually physically read the data.

Program overlays

This is a rather indirect facility. Basically the Perfect Calc software does not all permanently reside in RAM, but is swapped between disk and RAM as particular keystrokes invoke different bits of it. This is of no direct advantage to the user, but the indirect benefit is that Perfect Calc can be more extensive than otherwise, and so more facilities with all the bells and whistles can be fitted in! In fact the Perfect Calc programs require 75k of storage space, and only about half of that could be squeezed into the program space of a 64k RAM system.

As with the virtual memory facility, program overlays can be read in far more quickly if they are available on a silicon disk. The advantages are not quite as great as with virtual memory, because overlays do not hugely slow the system anyway. It is only when you call on a facility not currently in RAM that you get delayed at all. And since the program code does not change, it is not necessary for the system to waste time writing code out prior to it being overwritten (unlike virtual memory).

Multiple spreadsheets

Like many sophisticated spreadsheet systems, Perfect Calc has a split screen facility. It is possible to split the screen at some arbitrary point, into two 'windows', each looking at possibly quite different areas of the spreadsheet.

Perfect Calc takes this one stage further. Each window can actually be a window onto a physically different spreadsheet. The main value in this facility comes when information can be transferred from one sheet to another, and Perfect Calc provides good facilities for this. Each spreadsheet has a name, and formulae in one spreadsheet simply reference locations in another by using the name and location together, in a fairly natural way. For example spreada

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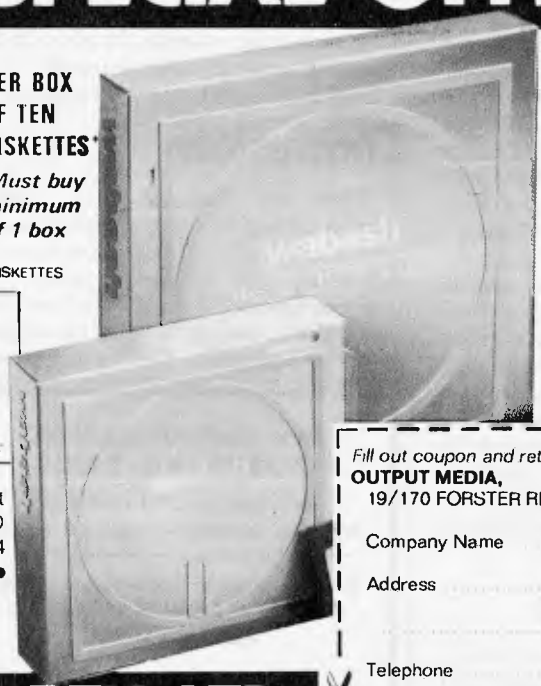

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Benchmarks and other measurements

Up to seven spreadsheets, each with — maximum number of columns: 52, maximum number of rows: 255.
Numeric precision: 13 digits. Individually variable column widths up to full width of display.
Benchmarks: These marks are fully described in *APC* April '83. Evaluation of Perfect Calc's performance has been postponed following repeated system errors encountered for the Benchmark 1 tests using the version of Perfect Calc supplied. Just prior to going to press an updated version was supplied which overcame these problems but time prevented us conducting the full Benchmarks. One timing using the supplied package was however successfully completed: recalculation of 40 rows took 2 minutes 14 seconds.

Checklist

Documentation: attractively packaged 350-page manual with tutorial and reference material and index. Reference card and also help screens and a considerable amount of tutorial demonstration data.
User-friendliness: poorly chosen key-hits for commands. 'Crashed' system on several occasions.
Facilities: extensive. Virtual memory extends maximum spreadsheet size, multiple linked spreadsheets. Comprehensive maths, replication, deletion, row and column inserts, automatic-manual and localised recalculation, extensive formatting and most other facilities shared by comparable spreadsheet systems.
Supplier: Perfect Software Inc, 1400 Shattuck Avenue, Berkeley, California.

(j29) accesses the value in cell j29 of spreadsheet spreada. It is also possible to lay one spreadsheet on top of another, new values overwriting the old without erasing anything else.

In fact, Perfect Calc can simultaneously handle up to seven spreadsheets, only two of which can be displayed at any given moment, one in each window. Switching displays can be achieved in just a few keystrokes. The cursor can only be in one spreadsheet at a time, and normally recalculations will only affect that one spreadsheet, thus saving a lot of time that would otherwise be spent waiting for a complete global recalculation. For recalculations to permeate through to the other spreadsheets, they need to be 'linked'. This is relatively easy to do.

I found the manual fairly weak on this aspect of the system, particularly with respect to suggested uses. The manual writer confesses ' . . . we must admit that the concept is so new and powerful that we ourselves have only scratched the surface of its potential capabilities.' At any rate, it ought to be possible to handle consolidation, and also possibly simplify links to other software, and neither possibility is mentioned in the manual.

Icing on the cake

There are a few other advanced facilities, perhaps not revolutionary in concept, but nice to have nonetheless. For example, there is 'formula-locking', the ability to protect a cell from accidental or intentional erasure or overwriting. There is also a special keystroke, which will quickly move the cursor from one UN-locked cell to another. Thus once a spreadsheet model has been set up and defined, all formulae can be locked, and data entry can be made as fast as possible.

It is also possible to force row and column titles to remain on screen, even when the cursor is somewhere right in the middle of the spreadsheet, and there are other niceties such as synchronising windows so that the columns (or rows) in the two windows always align correctly.

In short, a superb range of facilities.

Conclusions

I have no hesitation in highly recommending Perfect Calc. There was a huge breadth of documentation material describing an extensive range of facilities. Generally the system has a feel of quality, but with the occasional annoying glitches. See 'Benchmarks' below. Once the teething troubles are gone, however, this will be a very good package.

It barely needs to be said, but I will answer my original question at the start of the article: 'Perfect Software?' Well, not yet, anyway!

END

a	b	c
1january	8,250.73	15$b2/sin(b1:b12)
2february	9,123.45	15$b3/sin(b1:b12)
3march	4,567.12	15$b4/sin(b1:b12)
4april	11,000.45	15$b5/sin(b1:b12)
5may	123.54	15$b6/sin(b1:b12)
6june	1,199.77	15$b7/sin(b1:b12)
7july	5,435.34	15$b8/sin(b1:b12)
8august	7,654.23	15$b9/sin(b1:b12)
9september	4,567.23	15$b10/sin(b1:b12)
10october	8,000.45	15$b11/sin(b1:b12)
11november	6,543.23	15$b12/sin(b1:b12)
12december	4,566.44	15$b13/sin(b1:b12)

Fig 1. Different column widths. Column 1: Left justified. 2: Financial. 3: Formula display

a	b	c
1january	8,250.73$$$$$$$$$$	
2february	9,123.45$$$$$$$$$$$	
3march	4,567.12$$$$$$	
4april	11,000.45$$$$$$$$$$$$$	
5may	123.54	
6june	1,199.77$$	
7july	5,435.34$$$$$$	
8august	7,654.23$$$$$$$$$	
9september	4,567.23$$$$$$	
10october	8,000.45$$$$$$$$$$	
11november	6,543.23$$$$$$$$$	
12december	4,566.44$$$$$$	

Fig 2. Same column widths. Column 1: Left justified. 2: Financial format. 3: Graphics

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Aword on Atari

Despite its gaming image, the Atari has several word processors. Geoff Wheelwright has the latest.

The Atari range of computers have never been known for their great prowess in word processing, but Atari has just released a new cartridge W/P package it hopes will change that image.

Atariwriter will run on the 400, 800, 600XL and 800XL computers (yes, the 16K Atari 400). The program can be used with any Atari micro with a memory capacity of 16K or more, so it theoretically means you can run the little Atari 400 with a W/P and disk drive — although the reality of the situation is that the 400's 16K memory won't be able to do much in the way of world processing once you've loaded the Atari DOS into memory.

But you can still use the 400 quite effectively as a word processor if you have the Atari tape recorder as a storage unit and Atariwriter plugged into the 400's cartridge software slot.

Features

There is a good deal to Atari's chip-based word processor, starting with a simple, easy-to-understand menu system. When you "boot" your Atari with an Atariwriter cartridge in the left cartridge slot, the machine will immediately, enter Atariwriter, presenting you with eight options – each selectable with a single letter and Return.

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What's on the menu.

The options are: Create file, Delete file, Edit file, Format disk, Index of Disk files, Load, Print and Save files.

Most of the options are self-explanatory, although a few of them have some nice touches that make Atariwriter that much easier to use.

For example, the Edit file command will edit whatever file is in memory — instead of making you specify a file name first. File names are required only when you want to save the file after typing it in.

And if you want to edit an existing file, you load it into memory first, then go into Edit mode. When you're finished editing, you can either save the file under the same name or change the name and create an undated copy of the file.

Similarly, the file printing process also has some nice options, including the ability to preview files on-screen as they will be printed out — including the page breaks, paragraph marks and line spacing. Because the Atari doesn't come with an 80-column screen, the preview mode operates as a "scroll-across" imitation 80-column mode that lets you see where things are going to be on the page without requiring 80 columns.

Presentation

Atariwriter comes in a large silver cardboard box and features a picture of a typewriter poetically dumped in a

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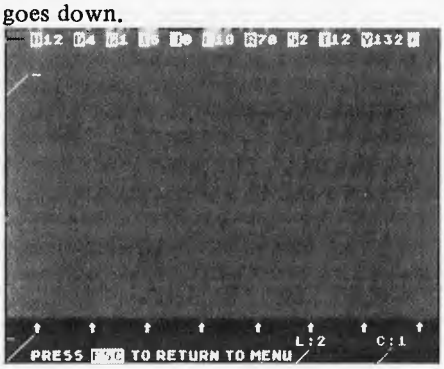
rubbish bin, with the clear implication that you'll feel so confident about your new-found word-processor that the typewriter will become redundant. (I wouldn't go that far – what about the long winter evenings when the power goes down.



On screen — formatting information on the top line, tab stops, line and cursor positions at bottom.

Atari has benefitted from its collaboration with Datasoft in that it's documentation is far simpler than the cumbersome Word Processor manual that preceded it. The Atariwriter documentation is more reminiscent of Datasoft's Text Wizard – simple, but perhaps sparse, documentation.

In use

Atariwriter is easy to use, with it's upper and lower case 40-column display and capability to embed commands for line spacing, paragraph breaks and justification. Anyone particularly fond of the TAB key on the Atari, however, is advised to resist the temptation to use it with Atariwriter. The program prefers a CTRL-P to a TAB, although the TAB can be used to move across the screen.

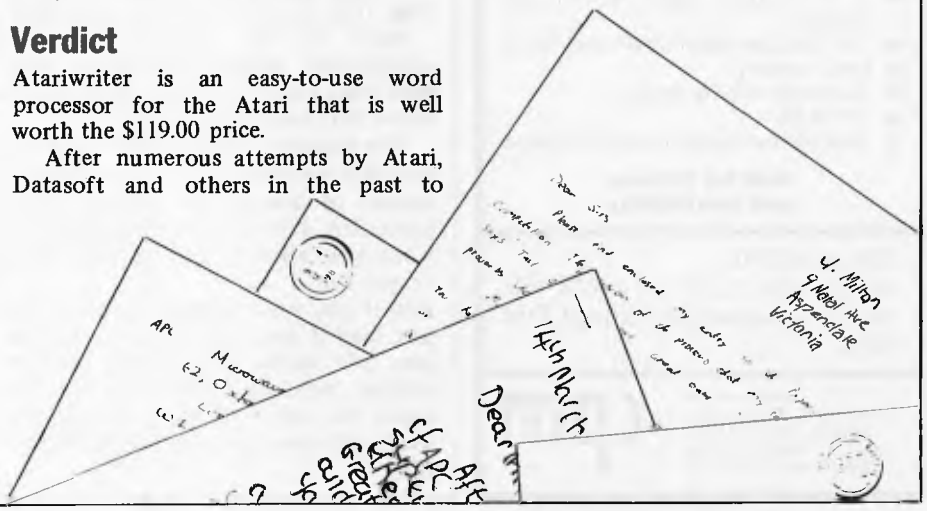
The preview mode is available from the program's Edit mode, so that you can see exactly what your text will look like when it's printed out. It takes the control codes (like the ones used for line spacing and paragraphs) and uses them to display your fully-formatted text.

Verdict

Atariwriter is an easy-to-use word processor for the Atari that is well worth the $119.00 price.

After numerous attempts by Atari, Datasoft and others in the past to produce a good word processor for the Atari, it took a collaboration between Atari and Datasoft to finally get it right.

Name:	Atariwiter
Application:	Word processor
System:	Atari 400, 600XL, 800 or 800 XL with minimum of 16k plus cassette storage
Price:	$119
Publisher:	Atari
Format:	Cartridge
Outlet:	Atari dealers.



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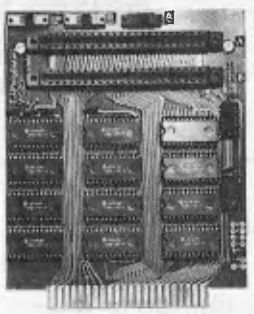

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LET
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Your Sinclair ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the Sinclair ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of Sinclair ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer — available now — is fully compatible with the Sinclair ZX Spectrum. And later there will be Microdrives for massive amounts of on-line storage, plus an RS232/network interface board.

Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – Beep command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High resolution – 256 dots horizontally and 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper and lower case characters.
- Teletext compatible – user software can generate 40 characters per line or other settings.
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- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

The ZX Printer available now

Designed exclusively for use with the ZX range of computers, the printer offers Sinclair ZX Spectrum owners the full ASCII character set – including lower case characters and high-resolution graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your Sinclair ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied along with full instructions. Further packs of paper are available in packs of five rolls.

The ZX Microdrive coming soon

The new Microdrives, designed especially for the Sinclair ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100 Kbytes using a single interchangeable storage medium.

The transfer rate is 16 Kbytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Sinclair ZX Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1984.

Your Sinclair ZX Spectrum and Printer carry a 3 month warranty, with service provided by S.T.C.'s national service network.

Sinclair ZX Spectrum Software on cassette — available now

The Sinclair software library is growing every day, and they all make use of the Sinclair ZX Spectrum's colour, sound and graphics. Choose from: Space Raider, Planetoids, Embassy Assault, Raiders, Backgammon – **each $19.50**; Planet of Death, Inca Curse, Ship of Doom, Espionage Island, Club Record Controller, Collectors Pack, Biorhythms – **each $22.50**; Chess, Flight Simulation, Vu-Calc Spreadsheet, Vu-3D Graphics, Reversi – **each $25.00**; View File Data Base, Cyrus-is-Chess – **each $27.70**; Scrabble, ZX Forth – **each $44.00**. ORDER NOW WITH YOUR SINCLAIR ZX SPECTRUM.

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This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Sinclair ZX Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

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Sinclair ZX Spectrum–technical data.

Dimensions

Width	233 mm
Depth	144 mm
Height	30 mm

CPU/ memory

Z80A microprocessor running at 3.5 MHz. 16K-byte ROM containing BASIC interpreter and operating system.

16K-byte RAM (plus optional 32K-byte RAM on internal expansion board) or 48K-byte RAM.

Keyboard

40-moving-key keyboard with full upper and lower case with capitals lock feature. All BASIC words obtained by single keys, plus 16 graphics characters, 22 colour control codes, and 21 user-definable graphics characters. All keys have auto repeat.

Display

Memory-mapped display of 256 pixels x 192 pixels; plus one attributes byte per character square, defining one of eight foreground colours, one of eight background colours, normal or extra brightness and flashing or steady. Screen border colour also settable to one of eight colours. Will drive a PAL UHF colour TV set, or black and white set (which will give a scale of grey), on channel 36.

Sound

Internal loudspeaker can be operated over more than 10 octaves (actually 130 semitones) via basic BEEP command. Jack sockets at the rear of computer allow connections to external amplifier/ speaker.

Graphics

Point, line, circle and arc drawing commands in high-resolution graphics.
16 pre-defined graphics characters plus 21 user-definable graphics characters. Also functions to yield character at a given position, attribute at a given position (colours, brightness and flash) and whether a given pixel is set. Text may be written on the screen on 24 lines of 32 characters. Text and graphics may be freely mixed.

Colours

Foreground and background colours, brightness and flashing are set by BASIC INK, PAPER, BRIGHT and FLASH commands. OVER may also be set, which performs an exclusive–or operation to overwrite any printing or plotting that is already on the screen. INVERSE will give inverse video printing. These six commands may be set globally to cover all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within these commands to cover only the results of that command. They may also be set locally to cover text printed by an INPUT statement. Colour-control codes, which may be accessed from the keyboard, may be inserted into text or program listing, and when displayed will override the globally set colours until another control code is encountered. Brightness and flashing codes may be inserted into program or text, similarly. Colour-control codes in a program listing have no effect on its execution. Border colour is set by a BORDER command. The eight colours available are black, blue, red, magenta, green, cyan, yellow and white. All eight colours may be present on the screen at once, with some areas flashing and others steady, and any area may be highlighted extra bright.

Screen

The screen is divided into two sections. The top section – normally the first 22 lines – displays the program listing or the results of program or command execution. The bottom section – normally the last 2 lines – shows the command or program line currently being entered, or the program line currently being edited. It also shows the report messages. Full editing facilities of cursor left, cursor right, insert and delete (with auto-repeat facility) are available over this line. The bottom section will expand to accept a current line of up to 22 lines.

Mathematical operations and functions

Arithmetic operations of +, –, ×, ÷, and raise to a power. Mathematical functions of sine, cosine, tangent and their inverses; natural logs and exponentials; sign function, absolute value function, and integer function; square root function, random number generator, and pi.

Numbers are stored as five bytes of floating point binary – giving a range of $+3\times10^{-39}$ to $+7\times10^{38}$ accurate to 9½ decimal digits.

Binary numbers may be entered directly with the BIN function. =, >, <, >=, <= and <> may be used to compare string or arithmetic values or variables to yield 0 (false) or 1 (true). Logical operators AND, OR and NOT yield boolean results but will accept 0 (false) and any number (true).

User-definable functions are defined using DEF FN, and called using FN. They may take up to 26 numeric and 26 string arguments, and may yield string or numeric results.

There is a full DATA mechanism, using the commands READ, DATA and RESTORE.

A real-time clock is obtainable.

String operations and functions

Strings can be concatenated with +. String variables or values may be compared with =, >, <, >=, <=, <> to give boolean results. String functions are VAL, VAL$, STR$ and LEN. CHR$ and CODE convert numbers to characters and vice versa, using the ASCII code.

A very powerful string slicing mechanism exists, using the form a$ (x TO y).

Variable names

Numeric – any string starting with a letter (upper and lower case are not distinguished between, and spaces are ignored).
String – A$ to Z$.
FOR-NEXT loops – A-Z.
Numeric arrays – A-Z.
String arrays – A$ to Z$.

Simple variables and arrays with the same name are allowed and distinguished between.

Arrays

Arrays may be multi-dimensional, with subscripts starting at 1. String arrays, technically character arrays, may have their last subscript omitted, yielding a string.

Expression evaluator

A full expression evaluator is called during program execution whenever an expression, constant or variable is encountered. This allows the use of expressions as arguments to GOTO, GOSUB, etc.

It also operates on commands allowing the ZX Spectrum to operate as a calculator.

Cassette interface

The ZX Spectrum incorporates an advanced cassette interface. A tone leader is recorded before the information to overcome the automatic recording level fluctuations of some tape recorders, and a Schmitt trigger is used to remove noise on playback.

All saved information is started with a header containing information as to its type, title, length and address information. Program, screens, blocks of memory, string and character arrays may all be saved separately.

Programs, blocks of memory and arrays may be verified after saving to confirm successful saving.

Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where two line numbers or variables names coincide, the old one is overwritten.

Programs may be saved with a line number, where execution will start immediately on loading.

The cassette interface runs at 1500 baud, through two 3.5 mm jack plugs.

Expansion port

This has the full data, address and control busses from the Z80A, and is used to interface to the ZX Printer, the RS232 and NET interfaces and the ZX Microdrives.

IN and OUT commands give the I/O port equivalents of PEEK and POKE.

ZX81 compatibility

ZX81 BASIC is essentially a subset of ZX Spectrum BASIC. The differences are as follows.

FAST and SLOW: the ZX Spectrum operates at the speed of the ZX81 in FAST mode with the steady display of SLOW mode, and does not include these commands.

SCROLL: the ZX Spectrum scrolls automatically, asking the operator "scroll?" every time a screen is filled.

UNPLOT: the ZX Spectrum can unplot a pixel using PLOT OVER, and thus achieves unplot.

Character set: the ZX Spectrum uses the ASCII character set, as opposed to the ZX81 non-standard set.

ZX81 programs may be typed into the ZX Spectrum with very little change, but may of course now be considerably improved. The ZX Spectrum is fully compatible with the ZX Printer, which can now print out a full upper and lower case character set, and the high resolution graphics; using LLIST, LPRINT and COPY.
ZX81 software cassettes and the ZX 16K RAM pack will not operate with the ZX Spectrum.

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GAMETRONICS SOFTWARE BONANZA for SPECTRUM 16K — 48K

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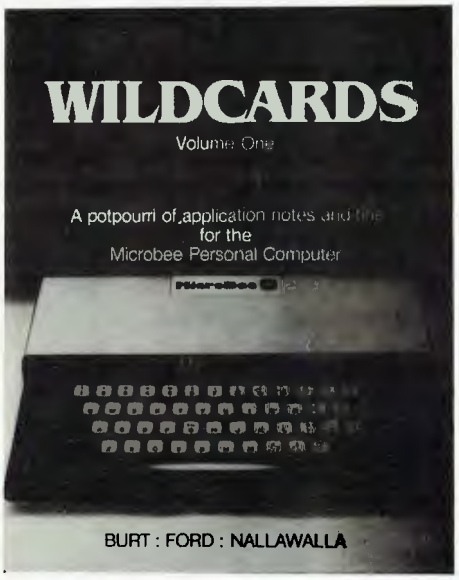
Computer novice, enthusiast or just eager to keep up with the automated society? Steve Withers gives personal appraisal of some of the many publications available in the computing market-place.

Wildcards Volume One



So you bought yourself a home computer, you have worked through the Basic manual, and you've laboriously typed in three or four programs from *APC*. What do you do next? You probably have a few ideas, but sometimes it is difficult to get started. What you need is a sourcebook that you can dip into for those "hints and kinks" which can save a lot of time.

"Wildcards" is such a book for the Microbee, written and published by three Microbee owners who wanted to share their experiences (if you will excuse the Californianism) with others. It is not a book for the absolute novice who is still struggling with Basic, nor will it attract the expert who probably knows it all anyway. The authors say it is aimed at "the intermediate user" – this would include people who have computing experience, but have only recently purchased a Microbee.

Some of the material in the book will be useful to a relatively small proportion of Microbee owners. For example, the chapter on "Printers and printing" concentrates on the Star DP8480 printer, although the program for printing cassette index cards would need the smallest alteration for use with other printers. On the other hand, I expect that many 'bee users could make good use of the section on graphics. An example is the (very short) machine-code routine which gives a super-fast way of putting a picture onto the screen. To the experienced user it might seem obvious or trivial, but it is no less valuable for that. There are programmable character generator definitions for a couple of dozen shapes, including a cannibal and a missionary!

When compared with some imported titles, the price of $15 for just over 100 A4 pages seems reasonable value. I feel that some people will find the program, which allows the transfer of a Basic program into the Word-Bee word processor sufficiently useful to justify buying the book, but as with most publications, it would be sensible to leaf through it to find out how much of the content is useful to you before dipping into your pocket.

C Programming Guide

There can be little doubt that C is the current language for the trendy programmer, and many people with a professional or recreational interest in computing are keen to learn something about it. Being in that category myself, I am not in a position to comment on how completely the book covers the language, but I am typical of the books intended readership.

I found this book very easy to read, with Purdum's easy-going style enhanced by the layout of the text and the use of a different typeface for programs, program fragments, and any element of the language whether they appear as separate examples or in the body of the text.

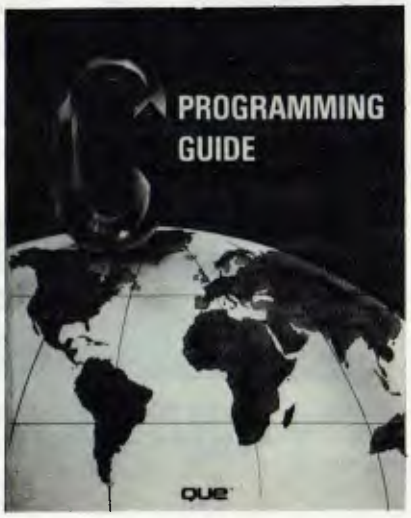
The sequence in which the various topics are presented makes it relatively simple for someone who already knows one programming language to get started with C. Chapter Two deals with operators, variables, and loops, which will be familiar ground to users of practically any language. The concept of restricting the scope of variables is introduced next, since this is an important difference between Basic and C.

At first glance, treating pointers before the input/output functions seems a little strange, but it turns out that the way C treats character string parameters to functions makes a prior understanding of pointers essential.

Later chapters deal with structures (similar to Pascal's records), unions (free variant records) and disk input/output with particular reference to CP/M-based systems. The final chapter is entitled "Common Mistakes and Debugging", and as well as a number of suggestions for pinning down compile-time errors it contains a brace-counting program (to check that there are as many "†" as " § "), the idea being that a single-minded program can pick up this common error much more quickly than the compiler.

There are the usual collection of appendices, one of which lists a number of inexpensive C compilers, starting at $US19.95.

The C Programming Guide was a pleasure to read, and I believe I learned a lot from it – what more can you ask from a book?



VisiCalc Models for Business

SuperCalc Super Models for Business

I have lumped these titles together as they cover the same ground for two of the popular spreadsheet programs. The only difference I could find (apart from those reflecting the differences between VisiCalc and SuperCalc) was that the SuperCalc book contains an extra model for preparing quotations.

The various models are presented in a standardised way. There are a few paragraphs describing the situation the model addresses, followed by a section detailing the accounting or mathematical principles involved. The way these principles are implemented in the spreadsheet is explained, along with the method of use. Finally there are usually some suggestions about how the model could be altered or extended to suit a different situation.

The spreadsheets themselves are printed on fold-out pages at the back of the books. The SuperCalc version gives printouts of the spreadsheets showing the formulae and typical data items separately, while VisiCalc users get the spreadsheet showing the sample data plus a listing of a VisiCalc file corresponding to the model.

The models themselves cover the following areas: cash management (yes folks, it's a chequebook balancer!), debt management, fixed asset management (I don't believe the American ACRS depreciation method has an Australian equivalent), working capital management, financial statements, and planning and budgeting. My guess is that at least half of the models would be of interest to the manager or professional person with financial responsibilities.

There is another group of people who could benefit from these books: those who prepare spreadsheet models for other people. The arrangement used whereby a model has a "contents" section at the top giving the co-ordinates of the other sections, an "assumptions" area where you plug in your data, and "results" and "instructions" screens seemed to me to be a very workable standard for presenting models.

The publishers very sensibly offer the models on diskette. There are two disks for each book, and each disk is $US39.95 plus postage (there was no indication that they are available locally). They would certainly save a lot of time.

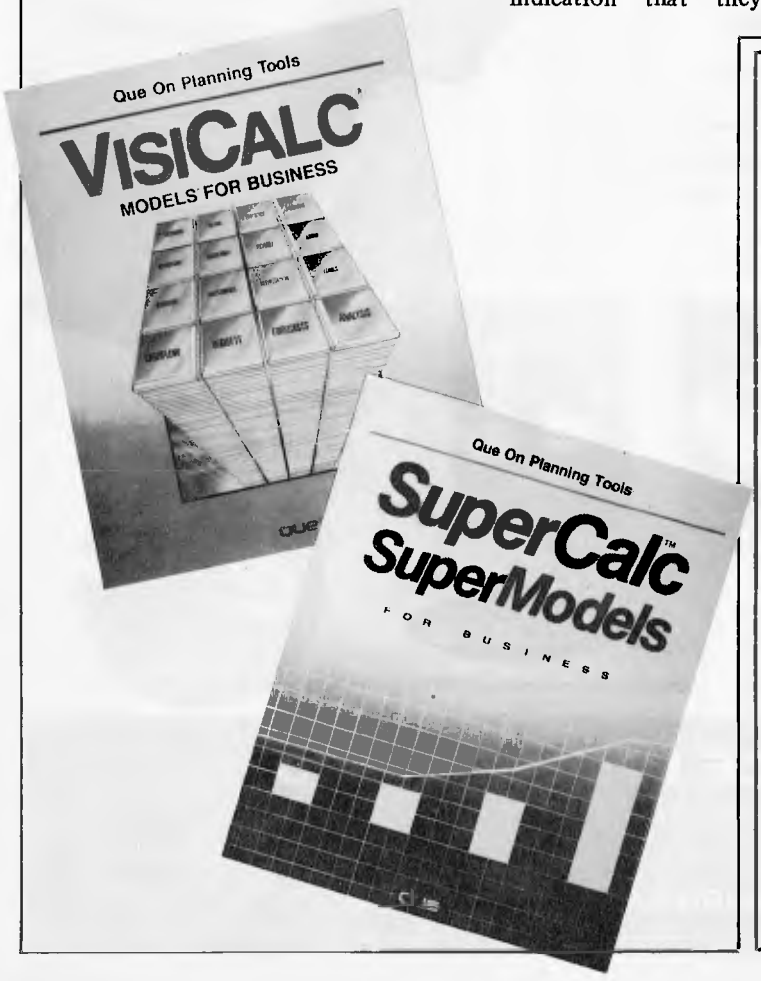
Out of curiosity, I converted one of the SuperCalc models (loan prepayment calculator) to work under Multiplan — the job was much easier than I expected, so it might be worth looking at these books even if you use a different spreadsheet program.

Wildcards Volume One.
Author: R.A. Burt, P.T. Ford, and A. Nallawalla.
Publisher: BF&N Publishing, Williamstown, Vic.
Price: $15.00.

C Programming Guide.
Author: J. Purdum.
Publisher: Que Corporation, Indianapolis, Indiana, USA.
Price: $33.50.

VisiCalc Models for Business.
Author: D.F. Cobb and G.B. Cobb.
Publisher: Que Corporation, Indianapolis, Indiana, USA. ISBN
Price: $27.95.

SuperCalc Super Models for Business.
Author: D.F. Cobb and G.B. Cobb.
Publisher: Que Corporation, Indianapolis, Indiana, USA.
Price: $27.95.



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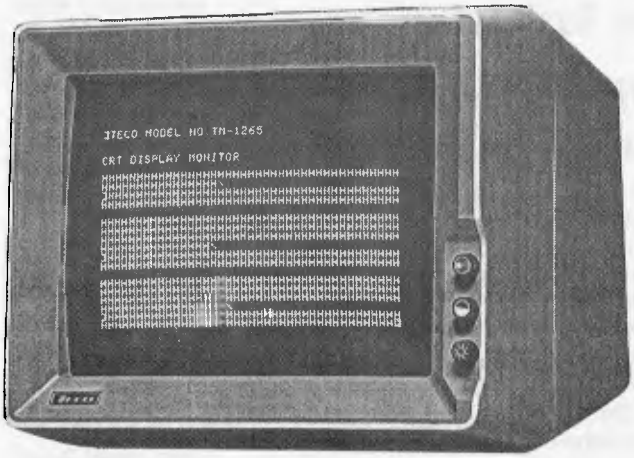

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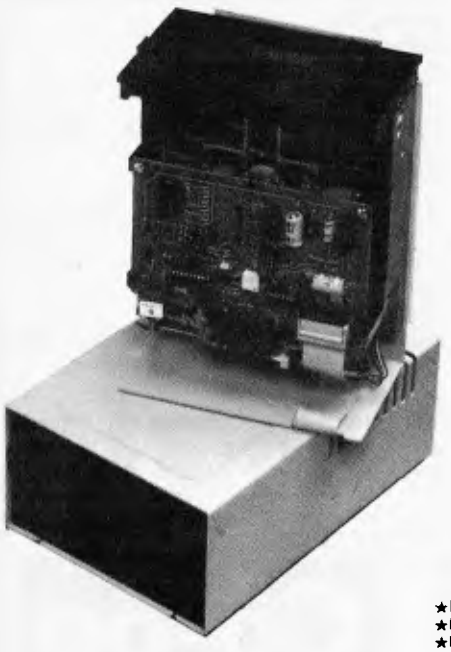

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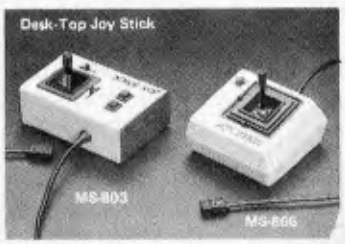

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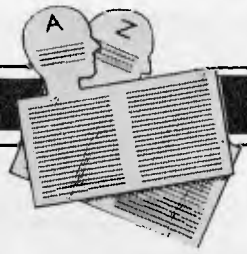
Readers are strongly advised to check details with exhibition organisers before making travel arrangements to avoid wasted journeys due to cancellations, printer's errors, etc.

Hong Kong	Percom '83 Contact: Adsdale Exhibition Services, 194 Lockhard Road 20/F, Wanchai, Hong Kong	December 16-19, 1983
Sydney	The Australian Personal Computer Show Contact: Australian Exhibition Services (03) 20 1208	March 14-17, 1984



USER GROUPS INDEX

Below is a list of alterations and additions to the list of user groups published in the June/July issue. The next full listing will appear in the December issue of APC.

NEW SOUTH WALES

Illawarra Apple Core
Meetings are held on the fourth Monday of each month at Holy Cross College, Bond Street, Bellambi at 8pm. For further information contact Bob Williams on (02) 96 6115.

VICTORIA

Bendigo VIC20/C64 Computer Users' Group
The club meets every fourth Friday, except in December, in the Library of the Bendigo College of TAFE, Macrae Street at 8.00pm. All users and potential users are invited to attend. And enquiries may be directed to Robert Lukeis on (054) 47 7593.

Kaypro Users Group is now operating in Melbourne. The next meeting is Sunday, 27th November at 2pm, at the Australian Council for Education Research, 9 Frederick Street, Hawthorn. All are welcome. Newsletter available monthly for interstate users. Membership $20 per year. All enquiries to KUGVIC, P.O. Box 159, Forest Hill 3131, or phone (03) 857 5462.

SOUTH AUSTRALIA

An Hitachi user group has been formed. Interested parties should contact Cliff Hignett at 45a Ormond Avenue, Daw Park 5041, or phone BH (08) 274 9341, AH (08) 295 2778.

WESTERN AUSTRALIA

The MicroBee Users' Group of WA meets on the first Sunday of each month at the Sir Charles Gairdner Hospital (Nurses' Lecture Theatre) between 7 and 9pm. A newsletter and library are provided. Telephone Mike Oborn on (09) 447 5366 for more details.

TASMANIA

The Tasmanian Commodore Users Association is primarily for Commodore users, it has an Associate membership status catering for users of other computers. It is a non-profit organisation. Contacts are The secretary, GPO Box 391D, Hobart 7000 or telephone Vincent Staggard on (002) 72 0295.

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All Micro Exchange ads must be submitted by readers on the appropriate form (or a photocopy). Maximum of 30 words. Print one word per box, very clearly. Contact name and telephone number/s must be included in the 30 words. All ads must be accompanied by a fee of $5.00 for Australian Personal Computer or $7.50 for inclusion in both Australian Personal Computer and Australian Business Computer. Make cheques or Postal Orders payable to Micro Exchange. Ads cannot be repeated (unless sent on another form) and we cannot guarantee to print an ad in any specific issue. Please help the typesetter by printing very clearly. Send your form to: Micro Exchange, P.O. Box 62, Middle Brighton. Vic 3186.

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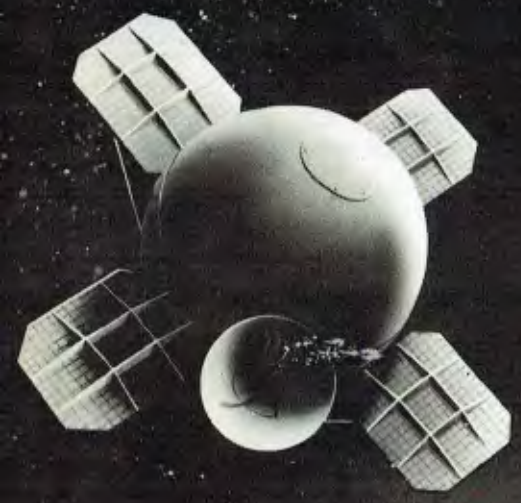

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You can print address labels, with selective mailings, membership renewal notices suitable for window face envelopes, cash summaries for banking, etc, while information stored for each member can include home and business telephone number, age, sex, marital status, date joined, date paid up to, current financial standing, etc., as well as your own special requirements.
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OFFICE COSTING ANALYSIS SYSTEM — SOFTWARE SOLUTIONS

OCAS is a system for keeping records of office costs and providing various reports regarding these costs. Costs can be either time related or fixed cost.
Normal monthly reports cover client reports detailing client jobs, and the associated time and costs; staff reports covering the jobs performed for individual clients; and task reports listing the staff involved.
Client accounts can be maintained, producing statements of any time and ageing reports to keep track of overdue accounts. With the 816's disk capacity, it is possible to keep 2000 entries in each of staff, tests, and transactions per month.

XMIT/RECV — SOFTWARE SOLUTIONS

This programme permits files of any type to be transferred from one computer to another, and can transfer files at up to 9,600 Baud through the RS232 port.
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Disk **E**ditor **A**nd **D**iagnostic has two invaluable applications:
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August Prize Puzzle

A fairly low entry this month although the puzzle wasn't too difficult. Most of the 135 entries contained the correct answer: Arthur was Susan's perfect man.

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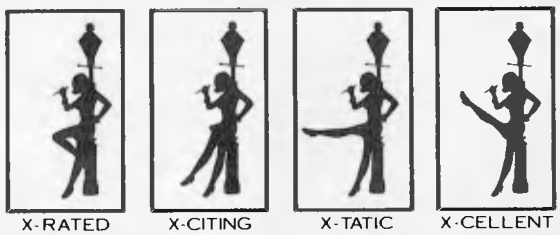

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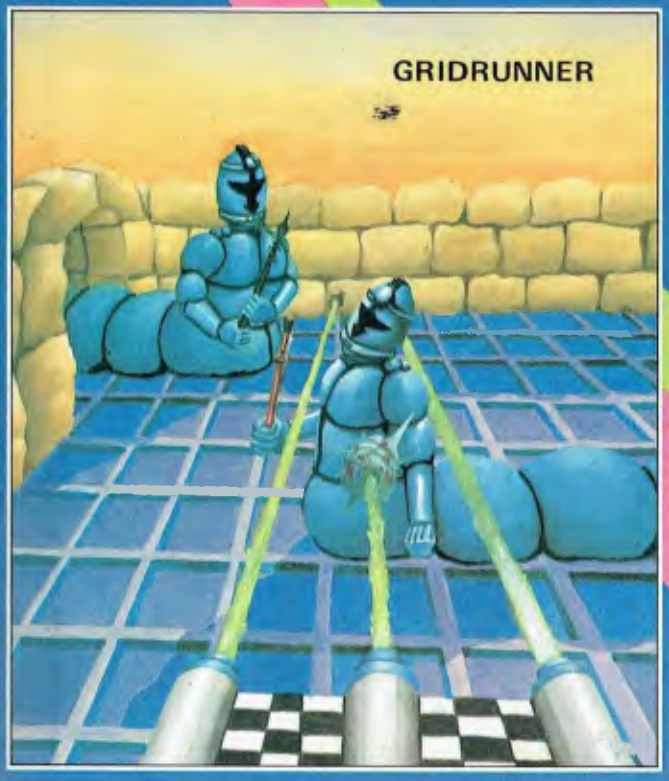

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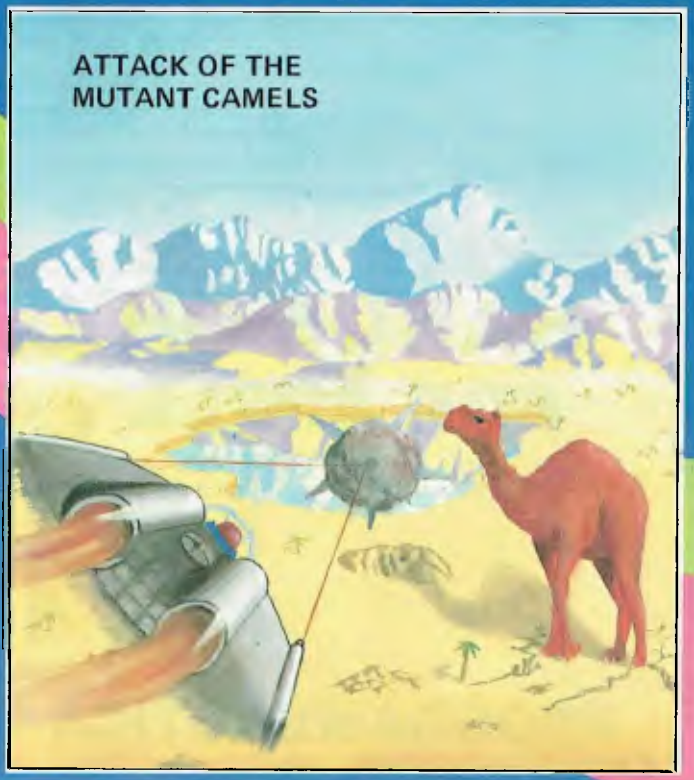

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PROGRAMS

APC is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs to APC please include the following:
(a) A cassette or disk of the program.
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(d) A suitable sae *if you would like your materials to be returned after use.*
Please mark (a), (b) and (c) with your name and address, program title, machine (state minimum RAM where appropriate) and — if possible — a daytime phone number. All programs must, please, be fully debugged. Send contributions to:
APC Programs, P.O. Box 298, Clayton, Vic. 3168.
We'll do our best to acknowledge receipt of programs as quickly as possible, but following this acknowledgement it will usually be some time before a decision can be made, so please be patient! Generally speaking, programs which are rejected for any reason are returned fairly quickly, so 'no news . . . '

You'll no doubt have noticed some strange-looking symbols alongside this month's Programs. Judging by reader feedback it seems that most people are primarily interested in one class of program, be it games, utilities or whatever. With this in mind, we've decided to help you identify programs quickly using the symbols.
Of course not all programs will fit into one of these categories, so these have not been given a symbol.

Games
Scientific/mathematic
Business
Toolkit/utilities
Educational/Computer Aided Learning

Pet Wave Simulation

by Robert Oakeshott

'Wave Simulation' is a simple program to demonstrate the principle of superimposition for the addition of two travelling waves. Although the resolution is very low, it is adequate for demonstration purpose in an 'O' level physics class.

It is possible to control the speed of the display by pressing 'f' (faster) to increase the speed and 's' (slower) to decrease it. As the program stands, it is not possible to freeze the display. It should be possible to allow a much slower movement, however, by editing line 350 to allow a higher value of k ('. . . and k<1000 . . .', for example).

Instructions are given within the program.

```
10 rem standing wave simulation
20 rem robert oakeshott 1982
30 poke 59468,14:rem lower case
40 poke 53,15:clr:rem redefine top of memory - poke 135,15 for old rom
50 lk=151:rem location to find key pressed - lk=515 for old rom
60 gosub 580:rem instructions
70 for i=7936 to 8192:poke i,0:next:rem clear table of wave positions...
80 rem set up table of scaled sin wave
90 for i=0 to 7
100 sn=sin((i/8)*i)
110 s2=12*sn
120 s3=int(s2+.5)
130 poke 8080+i,s3
140 poke 8088+i,(-s3) and 255
150 next
160 rem enter machine code
170 for i=4096 to 9999
180 read a$
190 if a$<>"#" then poke i,val(a$):next
200 rem enter lower half of pointers to screen lines
210 for i=0 to 24
```


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PROGRAMS

```
220 read a:poke 8096+i,a
230 next
240 rem enter upper half of pointers to screen lines
250 for i=0 to 24
260 read a
270 poke 8144+i,a
280 next
290 print tab(10);"■Press space to start■"
300 wait 59410,4,4:rem wait for space key
310 k=102:rem delay constant
320 sys 4096:rem move wave on
330 for j=1 to k:next:rem delay
340 get c$
350 if c$="s" and k<200 then k=k+20:poke 1k,255:rem slow down & repeat
360 if c$="f" and k>31 then k=k-20:poke 1k,255:rem speed up and repeat
370 goto 320
380 rem data for machine code
390 data 162,0,189,1,31,157,0,31,232,224,39,208,245,173,143,31,41,15
400 data 170,189,144,31,141,39,31,232,142,143,31,56,169,0,237,1,31,141
410 data 48,31,162,38,189,48,31,157,49,31,24,125,1,31,157,96,31,202,16
420 data 240,162,0,169,32,157,0,128,157,0,129,157,0,130,157,0,131,202
430 data 208,241,169,192,160,39,153,224,129,136,208,250,162,24,189,160
440 data 31,133,0,189,208,31,133,1,169,103,145,0,202,16,239,234,234,234
450 data 234,169,0,141,47,31,169,42,141,95,31,169,0,141,94,31,160,39
460 data 185,0,31,32,188,16,136,208,247,169,255,141,47,31,169,0,141,95
470 data 31,169,128,141,94,31,160,39,185,48,31,32,188,16,136,208,247
480 data 160,39,185,95,31,24,105,24,74,170,189,160,31,133,0,189,208,31
490 data 133,1,169,102,145,0,136,208,231,96,72,42,104,105,24,74,170,169
500 data 232,224,12,208,1,96,48,2,169,202,141,230,16,189,160,31,133,0
510 data 189,208,31,133,1,177,0,45,47,31,13,95,31,77,94,31,202,145,0
520 data 224,12,208,228,96,170,170,170,170
530 data "#"
540 rem data for start of screen locations
550 data 0,40,80,120,160,200,240,24,64,104,144,184,224,8,48,88,128,168,208,248
560 data 32,72,112,152,192,128,128,128,128,128,128,128,129,129,129,129,129,129
570 data 130,130,130,130,130,130,130,131,131,131,131,131
580 rem instructions
590 print "■";tab(13);"Standing Waves"
600 print     tab(13);"──────────"
610 print "■This program demonstrates the formation"
620 print "■of a standing wave, when an incident"
630 print "■wave inteferes with its reflection."
640 print "■The incident wave is shown by '*',the"
650 print "■reflected wave is shown by reverse"
660 print '■field, and their sum by '*'.
670 print"■■The program may be speeded up by"
680 print "■pressing the ■ F ■ key, and slowed down"
690 print "■with the ■ S ■ key."
700 return
ready.
```

Apple II Aplist

by G Keen

'Aplist' is a utility for an Apple II and requires the Microsoft TASC compiler. The listing below assumes an Epson MX-80 F/T III printer, but is simple to modify for any use with other printers.

The program takes a Basic program and produces a neat, paged hardcopy listing. The listing below was produced using 'Aplist'. The processed listing gives you (1) neatly-paged listings, (2) Basic keywords in lower-case, (3) REM statements enlarged (makes it easier to read listings) and (4) optional 'space-recognition'. Space recognition, if selected, prints underline characters in place of spaces within strings and data statements. This is useful where the number of spaces in a string is important.

When 'Aplist' requests first and last parameters, it is referring to the lowest and highest line numbers of the program to be listed.

After entering the program (and saving it as a precaution), it must be compiled using the TASC compiler. When running the compiler, select decimal 24576 as the runtime location and choose the default object code file. This places 'Aplist' above hires page 2, safely out of harm's way.

The easiest way to run the program is to set up an EXEC file containing:-

"BLOAD RUNTIME,A24576"
"BRUN LLIST.OBJ"

The program can then be run by EXEC APLIST.

It is also possible to run the program from Basic by renumbering it '60000,1', merging it onto the end of the program to be listed and the simply RUN 60000.

If you want to modify 'Aplist' for use with printers other than the Epson, the control codes used are:-

CHR$ (15)	— selects 16 characters per inch.
POKE 1657,132	— selects 132 characters per line
CHR$ (12)	— page skip on
CHR$ (14)	— selects double print width
CHR$ (23)	— toggles between upper/lower case
CHR$ (27); "—"; CHR$ (1)	— automatic under-lining on
CHR$ (27); "—"; CHR$ (0)	— automatic under-lining off

In line 220, the number 62 refers to page

length (no of lines). The number 122 in line 270 refers to the maximum print width; this will have to be adjusted to suit your printer and should be set to (maximum print width — 5).

'Aplist' works by scanning your program line by line until it finds a line greater than or equal to your first parameter. It then checks the memory location currently being examined. If this check reveals a keyword, then printer is switched to lower-case, the word is printed and the printer is switched back to upper-case. If the check reveals a REM statement, the printer is switched to enlarged print and the rest of the line is printed before switching back to normal sized print. If the character being examined is a space and the space-recognition option is on, then the space is underlined (underlining a space sounds a little unlikely, but the Apple will happily oblige). It then repeats this operation until it reaches your upper parameter.

```
10   dim A$(110):J = 0:K = 0:L = 1: for C = 1 to 107: read A$(C): next
90   text : home : print "PROGRAM LISTING UTILITY  (C) G.KEEN 1983              LLIST.": print : print
100  print "PRESS  1....TO LOAD YOUR PROGRAM": print "       2....TO LIST YOUR PROGRAM": print "       3....TO EXIT THE UT
     ILITY": print "       "; get Q$: if Q$ < "1" or Q$ > "3" then 90
101  if Q$ = "3" then  new
110  if Q$ = "1" then  home : print "LOAD PROGRAM, THEN TYPE '&' TO RE-RUN  LLIST": end
115  home : print "ENTER :-": print : print "PROGRAM NAME : "; input N$: print : print "PARAMETERS (FIRST,LAST) : "; input F,
     I: print : print "DATE FOR LISTING : "; input DT$
117  print : print "SPACE RECOGNITION (Y/N) : "; get Q$: if Q$ = "Y" then H = 1
120  if  len (DT$) > 8 then DT$ =  left$ (DT$,8)
130  print
150  print  chr$ (4)"PR#1": print  chr$ (15): poke 1657,132: gosub 340:A = 2049
160  E =  peek (A) +  peek (A + 1) * 256:M = 1
170  if E = 0 then  print  chr$ (4)"PR#0": goto 90
180  N = 0
182  A1 =  peek (A + 3)
184  A1 = A1 * 256
186  A1 = A1 +  peek (A + 2)
190  A = A + 4: if A1 > I then  print  chr$ (4)"PR#0": goto 90
200  if A1 < F then A = E: goto 160
210  J = J + 1:B = 7
220  if K > 62 then  print  chr$ (12): gosub 340
230  print A1; spc ( 6 -  len ( str$ (A1)));
240  B =  peek (A): if B = 0 then A = A + 1: print :K = K + 1: goto 160
250  if B > 127 and N = 0 then  print " ";
260  D = D + 1 * (N = 1)
270  N = 0: if B > 122 then  print : print  tab ( 7);:D = 7: B = B + 1: if N = 1 then  print  chr$ (14);
280  if B = 178 then D = 1:N = 1
290  A = A + 1
295  if B = 32 and H = 1 then  print  chr$ (95);: goto 240
300  if B < 128 then  print  chr$ (B);: goto 240
310  B = B - 127: print  chr$ (23);A$(B); chr$ (23);" ";: D = D +  len (A$(B))
320  if B = 1 then  print  chr$ (14);: B = 0
330  goto 240
340  print "APPLE PROGRAM LISTING"; spc ( 95);"PAGE : ";L: print  chr$ (27);"-"; chr$ (1);N$; spc ( 87 -  len (N$));"
                    DATE : ";DT$; spc ( 8 -  len (DT$));: chr$ (27);"-"; chr$ (0)
345  L = L + 1:K = 4: print : return
350  data END,FOR,NEXT,DATA,INPUT,DEF,DIM,READ,GR.TEXT,PR#,IN#,CALL,PLOT,HLIN,VLIN,HGR2,HGR,HCOLOR =,HPLOT,DRAW,XDRAW,H
     AS,HOME,ROT =,SCALE =,SHLOAD,TRACE,NOTRACE,NORMAL,INVERSE,FLASH,COLOR =,POP,VTAB,HIMEM:,LOMEM:,ONERR,RESUME,RECALL,ST
     ORE
360  data SPEED =,LET,GOTO,RUN,IF,RESTORE,&,GOSUB,RETURN,REM,STOP,ON,WAIT,LOAD,SAVE,DEF,POKE,PRINT,CONT,LIST,CLEAR,GET,N
     EW,TAB (,TO,FN,SPC (,THEN,AT,NOT,STEP,+,-,*,/,^,AND,OR,>,=,<,SGN,INT,ABS,USR,FRE,SCRN (,PDL,PDS
370  data SQR,RND,LOG,EXP,COS,SIN,TAN,ATN,PEEK,LEN,STR$,VAL,ASC,CHR$,LEFT$,RIGHT$,MID$
```

And, below, the first three lines of the listing with the space-recognition employed:-

```
10   dim A$(110):J = 0:K = 0:L = 1: for C = 1 to 107: read A$(C): next
90   text : home : print "PROGRAM_LISTING_UTILITY__(C)_G.KEEN_1983_____________LLIST.": print : print
100  print "PRESS__1....TO_LOAD_YOUR_PROGRAM": print "_______2....TO_LIST_YOUR_PROGRAM": print "_______3....TO_EXIT_THE_UT
     ILITY": print "_______"; get Q$: if Q$ < "1" or Q$ > "3" then 90
```

Calendars

by Kevin R Smith

'Calendars' is written entirely in Microsoft Basic and so should run on almost any micro with the absolute minimum of adaption.

The program calculates and prints the calendar of any month of any year between (wait for it) 25000 BC to 20000 AD and, yet, it does take into account the calendar reform of 1752. Try the calendar of September 1752 when the Julian calendar was abandoned in favour of the Gregorian.

To enter a date BC, prefix the date with a minus sign; to end the program, enter a zero for either the month or year. When entering a date, type month (1-12), year (—25000-20000). Attempting to follow the calculation involved is worse than Rubic's Revenge, but it does work for all the dates we tried. Arithmetic was never my strong point, so I'll leave you bright sparks out there to figure it out.

Our referee did manage to catch it out, incidentally. It doesn't work for 46 BC when the year was 445 days long. I'll take his word for it, trusting soul that I am.

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PROGRAMS

```
1 REM  CALENDARS by Kevin Smith
10 CLS:CLEAR1000:PRINTTAB(17);"CALENDARS":PRINT
15 DIMM$(12):FOR I=1 TO 12:READ M$(I):NEXT
20 DATAJanuary,February,March,April,May,June
21 DATAJuly,August,September,October,November
22 DATADecember
30 PRINT" A program to print a calendar of any month"
40 PRINT" of any year between 25000 BC and 20000 AD."
50 PRINT" Enter a negative number for years BC, or"
60 PRINT" two zeroes to end the program.":PRINT
100 INPUT" Enter month and year required";M,Y
110 IF M<0 OR M>12 OR Y<-25000 OR Y>20000THEN100
115 IF M=0 OR Y=0 THEN END
120 I=Y:A$="AD":IF Y<0 THEN A$="BC":I=-I:Y=Y+1
130 CLS:PRINTTAB(9);"Month of ";M$(M);I;A$
150 GOSUB1000:I=J:PRINT
160 PRINTTAB(11);"S  M  T  W  T  F  S"
170 M=M+1:IF M>12 THEN M=1:Y=Y+1
180 GOSUB1000:N=J-I:J=I-INT(I/7)*7+1
185 IF J=7 THEN J=0
186 J=J*3+10:K=1
187 IF Y<>1752 OR M<>10 THEN190
188 PRINTTAB(J);" 1  2";:K=14:J=22:N=30
190 FOR I=K TO N:PRINTTAB(J);
200 IF I>9 THEN PRINTCHR$(17);
210 PRINTI;
220 J=J+3:IF J>30 THEN PRINT:J=10
230 NEXT:PRINT:PRINT:GOTO100
1000 K=Y+4712:J=INT(K/4)+365*K
1010 N=30.6*M-32.3
1020 IF M>2 THEN1040
1030 N=N+2.3:IF K-INT(K/4)*4=0 THEN J=J-1
1040 J=J+INT(N+1)
1050 IF J<=2361221 THEN RETURN
1060 K=Y-300
1070 IF M<3 THEN K=K-1
1080 N=INT(K/100)
1090 J=J-INT(.75*N)-1:RETURN
Ok
```

Texas Breakout

by Des Farrell

'Breakout' is a version of the well-known arcade game for the TI-99/4A, a machine rarely spotted in these pages. Unfortunately, we didn't have a machine to test it on and the author's instructions were none too clear, so these notes are based mainly on reading the listing and making educated guesses.

The game is pretty-well standard. You have a bat at the bottom of the screen and a wall at the top. The idea is to use the bat to bounce a ball against the wall; as the ball strikes a brick, the brick will be removed from the wall. The bat is controlled using keys 's' and 'k' for left and right respectively. You have five balls per game and will be awarded a bonus wall if you score 100 points. You are scored on the number of bricks you destroy; one point for bricks on the bottom level, two points for the next and five for the top.

A new ball is set in motion by pressing any key. When the game ends, press 'Y' to play again or 'N' to end.

```
120  CALL CLEAR
130  RESTORE
140  CALL SCREEN(16)
150  PS=2
160  IF PS=18 THEN 240
170  PS=PS+2
180  READ A$
190  GOSUB 1700
200  GOTO 160
210  DATA "THE OBJECT OF THE
GAME IS","TO KNOCK DOWN THE
PIECES","OF THE WALL USING F
IVE"
```

"The problem was with two suppliers: one was Porter Hurd Components, and the other was Testology. They were influenced by Tom Davidson, who was fired at the beginning of the year for selling secrets to Access Data, to sue for payments of $4½m worth of main circuit boards. It was at least part vindictiveness, because Davidson realised that the rescue plans were starting to work."

Who knows: that cloak and dagger fantasy may be absolute literal truth. On the other hand, the theory being leaked from California legal authorities (that Adam Osborne negligently allowed false financial information to be filed with the Securities Exchange Commission) could prove to be simple uninformed rumour-mongering.

It does seem certain that there are legal complications, and it seems likely that Adam Osborne is not the only person anxious to clear up his level of responsibility in the mind of the legal world.

This industry was a lot more exciting in the days when Adam Osborne was a publisher, and a man with opinions to sell, and didn't have to temper his opinions with the consideration of how they would affect his own company's position.

Microsoft releases OS 'standard'

Microsoft has made its bid to standardise 8-bit micros by releasing the MSX-DOS operating system.

Microsoft claims the backing of 14 Japanese and one US computer manufacturers for the MSX standard. MSX-DOS is CP/M-80 2.2 compatible and runs all Microsoft's 8-bit software including the programming languages MBasic, Cobol-80 and Fortran-80.

The first batch of MSX-DOS systems will be ready in January 1984, selling for around $150.

On the Eve of Adam

Wordprocessing is the latest stumbling block in the path of Coleco's Adam as it totters towards full production.

Reports from the US indicate that the word processing software to be supplied with the $700 Adam is far from being the professional program that was promised. Coleco is said to have undertaken to improve the software with a $30 or $40 utility package early next year, but this would contradict what it was saying earlier in the year: that the word processing would need no additions to function as a professional quality system.

Shipments of the Adam are due to begin this month; they were originally planned for the end of August but problems with the system's tape drive set it back.

Coleco is largely a victim of its own publicity — the Adam was launched with

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"Andrews," it barked, "have you come up with those figures yet?

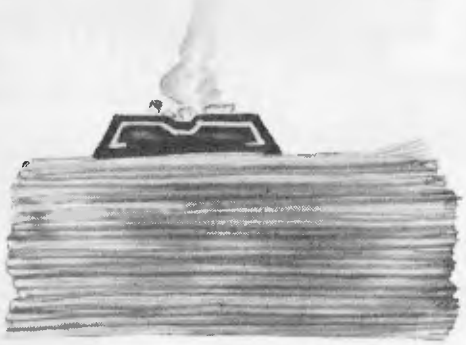
"Take it easy," I said. "I'm on the case."

"Andrews, you won't have the fingers to *grip* a bloody case if you don't deliver the goods. Nobody messes with the firm.

"OK, OK," I whined. "Just give me 'til tomorrow morning . . ."

There was a grunt and then just the purr of a dialling tone. My hands were sweaty and it wasn't from the sweet and sour pork I'd had for lunch. I poured a shot of bourbon and rummaged for the July issue of Australian Personal Computer. There was an article on sub-routines in the January issue which might save me several hours of number-crunching. Now where was that issue?"

Ten minutes later the first pricklings of panic ran up my spine. It had vanished. If only I'd ordered a Mark II *APC* Binder to keep the copies in. Already I could imagine the roaring whine of the chain saw . . . maybe they'd only take a *few* fingers. . .



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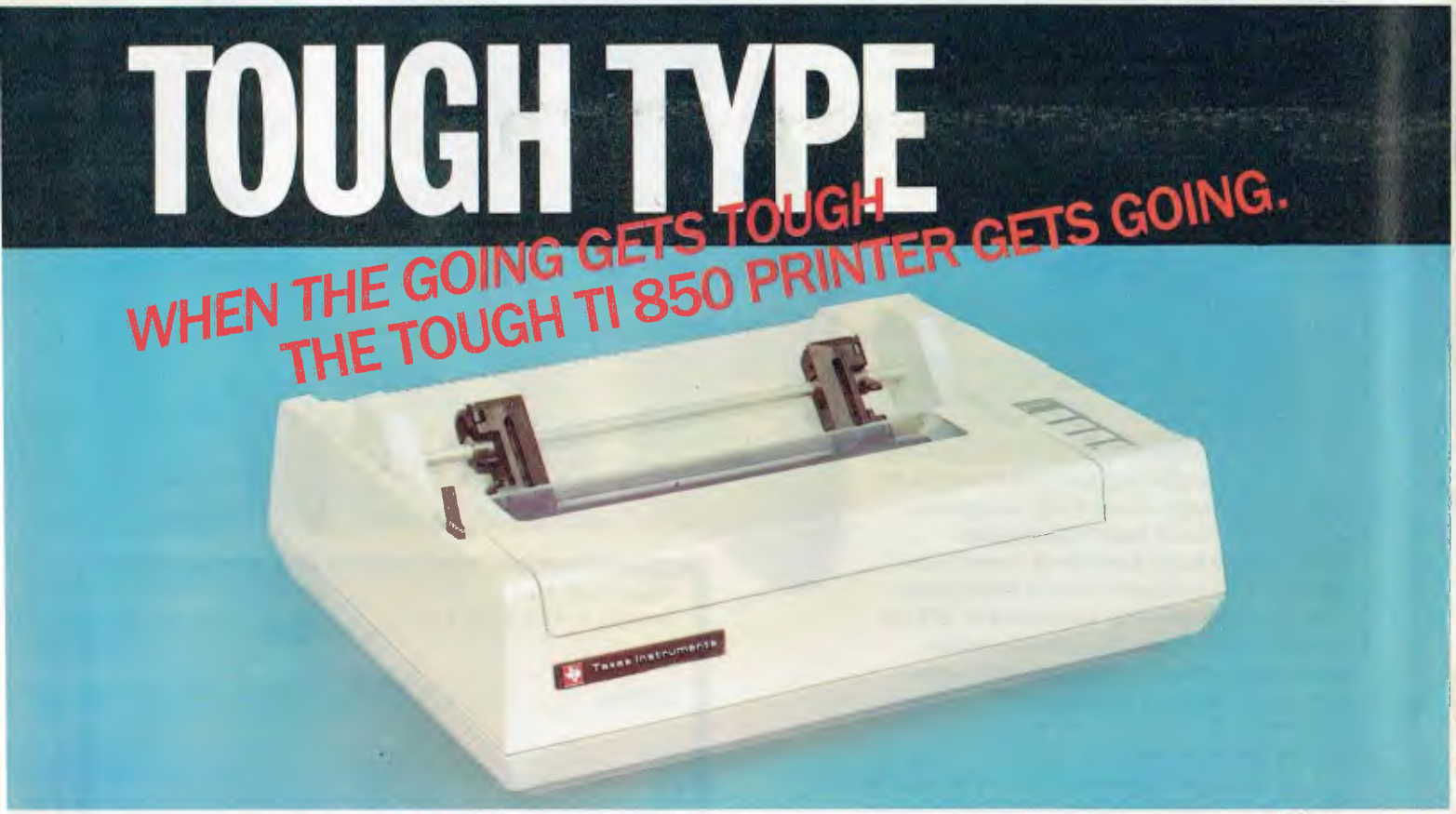
PROGRAMS

```
530  A$="MAN 5"
540  W=2
550  GOSUB 1750
560  CALL HCHAR(10,26,48)
570  REM BUILD WALL
580  FOR I=4 TO 6
590  CALL HCHAR(I,9,120,15)
600  NEXT I
610  RANDOMIZE
620  A=INT(RND*15)+8
630  B=7
640  BD=1
650  IF A>19 THEN 660 ELSE 68
0
660  AD=-1
670  GOTO 690
680  AD=1
690  CALL KEY(0,K,S)
700  IF S=0 THEN 690
710  GOTO 1000
720  CALL KEY(0,KY,ST)
730  IF KY=83 THEN 860
740  IF KY=75 THEN 860
750  A=A+AD
760  B=B+BD
770  IF A<9 THEN 1040
780  IF A>23 THEN 1040
790  IF B<2 THEN 1100
800  IF B>23 THEN 1140
```



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```
810   CALL GCHAR(B,A,G)
820   IF G=120 THEN 1310
830   CALL HCHAR(B,A,46)
840   CALL HCHAR(B,A,32)
850   GOTO 720
860   CALL HCHAR(24,BT 32)
870   CALL HCHAR(24,BT+1,32)
880   CALL HCHAR(24,BT+2,32)
890   IF KY=83 THEN 900 ELSE 9
20
900   BT=BT 1
910   GOTO 930
920   BT=BT+1
930   IF BT<6 THEN 940 ELSE 97
0
940   BT=6
950   CALL SOUND(30,-1,0)
960   GOTO 1000
970   IF BT>23 THEN 980 ELSE 1
000
980   BT=23
990   CALL SOUND(30,-1,0)
1000   CALL HCHAR(24,BT,128)
1010   CALL HCHAR(24,BT+1,128)
1020   CALL HCHAR(24,BT+2,128)
1030   GOTO 750
1040   REM HIT SIDE WALLS
1050   AD=-AD
1060   CALL SOUND(30,380,0)
1070   IF B<2 THEN 1100
1080   IF B>23 THEN 1140
1090   GOTO 750
1100   REM HIT TOP
1110   BD=-BD
1120   CALL SOUND(30,380 0)
1130   GOTO 750
1140   REM HIT BAT
1150   BD=-1
1160   CALL SOUND(30,380,0)
1170   IF A=BT THEN 1250
1180   IF A=BT+1 THEN 1270
1190   IF A=BT+2 THEN 1290
1200   MAN=MAN-1
1210   CALL SOUND(30,-1,0)
1220   CALL HCHAR(8,7,MAN+48)
1230   IF MAN=0 THEN 1800
1240   GOTO 620
1250   AD=-1
1260   GOTO 750
1270   AD=0
1280   GOTO 750
1290   AD=1
1300   GOTO 750
1310REM HIT WALL
1320   BD=-BD
1330   CALL SOUND(30,380,0)
1340   IF B=6 THEN 1370
1350   IF B=5 THEN 1400
1360   IF B=4 THEN 1440
1370   SC=SC+1
1380   GOSUB 1500
1390   GOTO 830
1400   SC=SC+2
1410   GOSUB 1500
1420   AD=-AD
1430   GOTO 830
1440   SC=SC+5
1450   IF BD=1 THEN 1460 ELSE
1470
```


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PROGRAMS

```
1460  AD=-AD
1470  REM GOTO SCORE
1480  GOSUB 1500
1490  GOTO 830
1500  REM SCORE
1510  IF SC =100 THEN 1580 EL
SE 1520
1520  X=INT(SC/10)
1530  Y-SC-(X*10)
1540  CALL HCHAR(10,27,X+48)
1550  CALL HCHAR(10,28,Y+48)
1560  RETURN
1570  PS=8
1580  A$="BONUS"
1590  W=13
1600  GOSUB 1750
1610  FOR I=200 to 400 STEP 1
0
1620  CALL SOUND(30,1,0)
1630  NEXT  I
1640  CALL HCHAR(8,12,32,7)
1650  Z=Z+1
1660  CALL HCHAR(10,26,Z+48)
1670  SC=SC-(Z*100)
1680  GOSUB 1520
1690  GOTO 580
1700  FOR I=2 TO 8
1710  CALL COLOR(I,5,16)
1720  NEXT I
1730  W=3
1740  REM ASC FIND
1750  FOR I=1 TO LEN(A$)
1760  Q=ASC(SEG$(A$,I,1))
1770  CALL HCHAR(PS,I+W,Q)
1780  NEXT I
1790  RETURN
1800  CALL CLEAR
1810  CALL SCREEN(16)
1820  A$-"          GAME OVER
"
1830  PS=8
1840  GOSUB 1750
1850  A$="DO YOU WANT TO PLAY AGAIN?"
1860  PS=23
1870  GOSUB 1750
1880  CALL KEY(0,KE,S)
1890  IF S=0 THEN 1880
1900  CALL HCHAR(23,30,KE)
1910  IF KE=89 THEN 100 ELSE
1920
1920 END
```

Testing Your Fingers

by J Mace

Sharpen your skills with this Keyboard test routine. It's written in Commodore Basic and gives you a guide as to the level of your key tapping skills.

```
1 PRINT"□"
5 GOSUB310
7 POKE53280,6:POKE53281,3
8 PRINT"□"
10 PRINT SPC(7) "**** KEYBOARD SKILLS ****"
11 PRINTSPC(7)"═══════════════════"
12 PRINT:PRINT:PRINT
15 PRINT"  TYPE THE KEY ........MAX SCORE 25"
16 FOR T=1 TO 5000
```

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SAT 9am — 1pm

VA140 VIDEO DISPLAY TERMINAL

SPECIFICATIONS

VA140
DISPLAY
- Standard Character Set: US ASCII, 32 Line drawing graphics
- Character Matrix: 7 x 9 with descenders
- Double size characters on command
- Visual Attributes: Reduced intensity, Reverse video, Underline, Blinking (selectable for any character)
- Normal or Reverse video (selectable for whole screen)
- 25th Status Line
- Screen Saver
- Contrast controlled front panel.

KEYBOARD
- Typewriter-like layout
- Keycap: Standard slope Keycap
- 14-key numeric pad
- 5 Cursor Control Key, 7 Editing Key, 7 Function Key

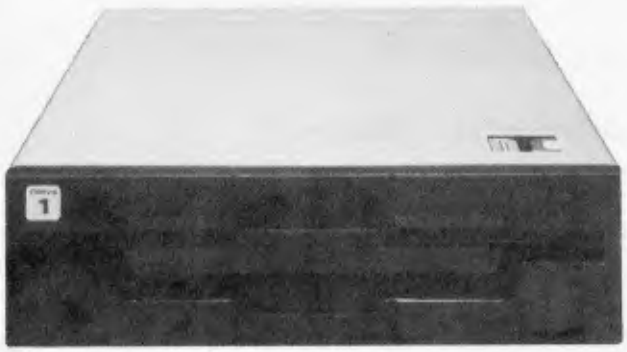
PRICE: $780 + TAX

VA120
DISPLAY
- Standard character sets: 128 ASCII, 32 special graphics, 30 line drawing graphics
- Extra Character Sets: U.K., Japanese
- Double Size Characters on command
- 7x9 Character Matrix with descenders
- Dual Intensity, Blinking, Underline, Reverse Video (selectable for each character)
- Normal or Reverse Video (Selectable for whole screen)
- Smooth Scroll or Jump Scroll
- Split Screen operation
- Brightness controlled from keyboard
- Screen Saver

KEYBOARD
- Low-profile, Ergonomic design
- Keycap: Standard Slope type Keycap or Sculpture Keycap
- Keyswitch: Tactile or Non-Tactile
- 13-key numeric pad
- Key-Click on/off
- 5 LED Indicators for On Line, Local, Keyboard-locked, Insert and Edit, plus 2 user programmable LEDs.

PRICE: $1,000 + TAX

NF-555 DISK DRIVE

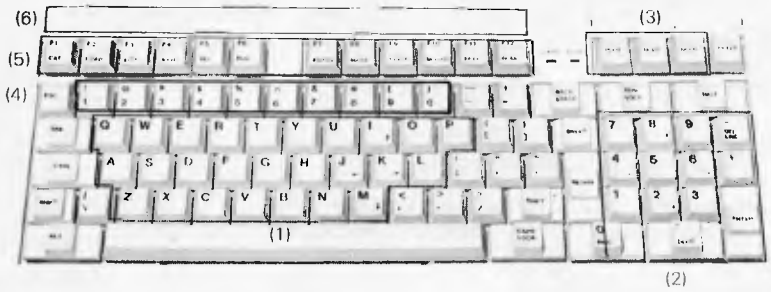


NF-555 SPECIFICATIONS

- Drive Capacity
  Unformatted
  Media.....250K Bytes
  Track.....6520 Bytes
  Formatted (16 Sector Apple-format)
  Media.....140K Bytes
  Track.....4096 Bytes
- Sector Method .....Soft
- Spindle Actuator .....Direct Drive
- Head Positioning Method .....Metal Band
- Rotational Speed 300rpm
- Data Density.....5536 Bpi
- Track density .....48 Tpi
- Number of Tracks .....MAX 40 (Normal 35)
- Transfer Rate .....250K bit/sec
- Access Time (16 Sector Apple-format)
  Seek Rate.....12msec
  Setting
  MAX 20msec, TYP 12msec
- Zero Track Seeking Method .....Electrical
- Motor Start Time .....MAX 0.5sec
- Dimension ...43(H)x148(W)x225(D)mm

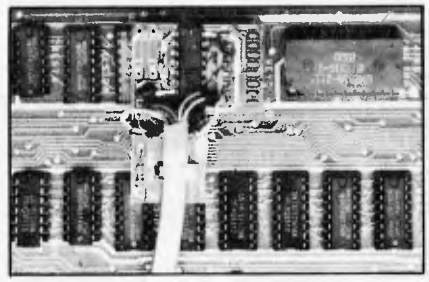
PRICE: $298.00 + TAX

THE BOSS-1 KEYBOARD IS SPECIALLY DESIGNED FOR APPLE-II* PERSONAL COMPUTER



1. Standard typewriter layout with upper/lower case and auto repeat; each alphabetic is built-in two layer one key basic commands, total 52 commands.
2. 14 keys numeric pad with 8 screen editor function keys.
3. User-defined function keys open define, close define, clear define.
4. 10 keys for storage max. 60 character user-defined program.
5. 12 function keys contain auto line number, key click sound and 12 specified codes for the professional designers.
6. Attached label to print contents of user-defined program.
   Dimensions: 184mmx400mmx33mm
   Weight: 1.6 kg.

PRICE: $288 + TAX



Connecting with a serial/parallel board, Boss-1 keyboard unit can be a peripheral of Apple II computer to make operation more efficient and convenient.

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5¼"	BOX OF 10	8"	
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SSDD	$37.00	SSDD	$46.00
DSDD	$45.00	DSDD	$64.00

PRICE PLUS TAX

5 Year Warranty on Diskettes

```
17 NEXT T
20 LETH=0
30 FORT=1TO25
40 FORI=1TO INT(RND(1)*300+1000)
50 NEXTI
60 LETA=INT(RND(1)*40)
70 LETD=INT(RND(1)*25)
80 LETP$=CHR$(INT(RND(1)*26)+65)
90 PRINT"□"
100 FORJ=0TOD
110 PRINT
120 NEXTJ
130 PRINTTAB(A);"■"P$
140 FORI=1TO500
150 GETR$
160 IFR$=P$THEN GOTO 210
170 IFR$<>""THEN GOTO190
180 NEXT I
190 PRINT"  MISSED":GOSUB500
200 GOTO230
210 PRINT"  A HIT":GOSUB400
220 LETH=H+1
230 NEXT T
240 PRINT"□"
250 PRINT"■■■■■■■■■■■■YOU SCORED ";H;"/25"
260 PRINT"■■■DO YOU WANT ANOTHER GO?  Y / N"
270 INPUTB$
280 IFB$="Y"GOTO8
290 IFB$="N" GOTO300
300 END
310 PRINT"■■■■THE PROGRAMME DISPLAYS A RANDOM ALPHABET LETTER ONTO THE SCREEN."
320 PRINT"■■TYPE THE LETTER BEFORE IT DISAPPEARS,BUT DO NOT TYPE AFTER THE TONE.
"
330 PRINT"■■ONLY ONE ATTEMPT AT EACH LETTER."
340 PRINT"■■■■■■■■■■**PRESS ANY KEY TO CONTINUE**"
350 GETK$:IFK$=""GOTO350
360 RETURN
400 S=54272:POKES+24,15:POKES+5,100:POKES+1,25:POKES+0,177:POKES+4,17
410 FORP=1TO100:NEXT
420 POKES+4,0:POKES+5,0:POKES+6,0
430 RETURN
500 S=54272:POKES+24,15:POKES+5,100:POKES+1,12:POKES+0,216:POKES+4,17
510 FORP=1TO100:NEXT
520 POKES+4,0:POKES+5,0:POKES+6,0
530 RETURN
```

Apple Dotter

by R Scott

This is a puzzle game for the Apple II and IIe. Full instructions are included in the listing.

```
130  HOME
140  INVERSE : PRINT "
150  SPEED= 150
160  PRINT " D O T T E R . . . . . .";: SPEED= 255
170  PRINT "                                "
180  NORMAL
190  PRINT
200  PRINT "ELIMINATE THE DOTS BY MOVING THE CURSOR"
210  PRINT "OVER THEM.  IF YOU HIT THE WALLS YOU     CRASH !!!"
220  PRINT "YOU GAIN TWO BONUS MOVES FOR EACH OF THE";
230  PRINT "DOTS ELIMINATED. ": PRINT
240  PRINT "REMEMBER - YOU HAVE A LIMITED NUMBER OF"
250  PRINT "MOVES.THE CONTROL KEYS ARE:-": PRINT
260  PRINT "'I'=UP:'M'=DOWN:'J'=LEFT:'K'=RIGHT."
270  PRINT : PRINT "PRESS ANY KEY TO BEGIN"
280  GET I$: IF I$ = "" THEN 280
```

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MSX software compatible standard

	SPECTRAVIDEO SV 328	SPECTRAVIDEO SV 318	APPLE II E	ATARI 800	COMMODORE 64	BBC MODEL B	DRAGON 32	SPECTRUM
COMPUTING POWER FEATURES								
BUILT-IN ROM	48K	32K	16K	10K	20K	16K	16K	16K
EXPANDABLE TO	96K	96K	N/A	42K	N/A	64K	N/A	N/A
BUILT-IN EXTENDED MICROSOFT® BASIC	YES	YES	YES	ADDITIONAL COST	NO	NO	YES	NO
BUILT-IN RAM	80K*	32K***	64K	48K	64K	32K	32K	16K
EXPANDABLE TO	256K**	256K**	64K	NO	N/A	32K	64K	48K
KEYBOARD FEATURES								
NUMBER OF KEYS	87	71	63	61	66	73	53	40
USER DEFINE FUNCTIONS	10	10	N/A	4	8	10	N/A	N/A
SPECIAL WORD PROCESSING	YES	YES	NO	NO	NO	NO	NO	NO
GENERATED GRAPHICS (FROM KEYBOARD)	YES	YES	NO	YES	YES	YES	YES	YES
UPPER/LOWER CASE	YES	YES	YES	YES	YES	YES	YES	YES
GAME/AUDIO FEATURES								
SEPARATE CARTRIDGE SLOTS	YES	YES	NO	YES	NO	NO	YES	NO
BUILT-IN JOYSTICK	NO	YES	NO	NO	NO	NO	NO	NO
COLORS	16	16	15	128	16	16	9	8
RESOLUTION (PIXELS)	256x192	256x192	280 x 160	320 x 192	320 x 200	256 x 640	256 x 192	256 x192
SPRITES	32	32	N/A	4	8	N/A	16	N/A
SOUND CHANNELS	3	3	1	4	3	1	3	1
OCTAVES PER CHANNEL	8	8	4	4	9	3	5	3
A.D.S.R. ENVELOPE	YES	YES	NO	NO	YES	YES	NO	NO
PERIPHERAL SPECIFICATIONS								
CASSETTE	2 CHANNEL	2 CHANNEL	1 CHANNEL	2 CHANNEL	1 CHANNEL	2 CHANNEL	2 CHANNEL	1
AUDIO I/O	YES	YES	NO	YES	NO	NO	YES	NO
BUILT-IN MIC	YES	YES	NO	NO	NO	NO	NO	NO
DISK DRIVE CAPACITY (LOW PROFILE)	256K	256K	143K	92K	170K	100K	100K	100K
	YES	YES	NO	NO	NO	NO	NO	NO
CP/M® COMPATIBILITY (Standard 80 column programs)								
CP/M® 2.2	YES	YES	NO****	NO	NO*****	YES	NO	NO
CP/M 3.0	YES	YES	NO	NO	NO	NO	NO	NO

Specifications are subject to change without prior notice

* 64K user addressable plus 16K graphic support
** 240K user addressable plus 16K graphic support
*** 16K user addressable plus 16K graphic support
**** Apple II can accept modified 40 or 80 Column CP/M
***** Commodore 64 accepts 40 column CP/M

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CP/M is a trademark of Digital Research Inc.

SAD-83-004

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```
290 C = 4: GOTO 320
300 C = 15:
310  IF C = 15 THEN D = 14
320  HOME : GR : POKE  - 16301,0
330 SC = 0:COUNT = 0:MO = 210
340  GOSUB 530
350  GOTO 720
360  COLOR= 14
370 X = 1:Y = 38
380  PLOT X,Y
390  GET I$: IF I$ = "" THEN  GOTO 390
400  COLOR= 0: GOSUB 640
410  IF I$ = "M" THEN Y = Y + 1
420  IF I$ = "K" THEN X = X + 1
430  IF I$ = "I" THEN Y = Y - 1
440  IF I$ = "J" THEN X = X - 1
450 MO = MO - 1
460  VTAB 22: PRINT "MOVES LEFT ";MO;"    SCORE:";SC;" "
470  IF SC = 50 GOTO 890
480  IF MO <  = 0 THEN  GOTO 800
490  COLOR= 14
500  GOSUB 640
510  GOTO 390: REM  RETURN FOR NEXT MOVE
520  REM  SUBROUTINE FOR DRAWING BOARD
530  COLOR= C: VLIN 0,39 AT 0
540  VLIN 0,39 AT 39
550  HLIN 0,39 AT 0
560  HLIN 0,39 AT 39
570  HLIN 1,2 AT 32: HLIN 8,32 AT 32: HLIN 1,26 AT 26
580  HLIN 1,7 AT 20: HLIN 13,33 AT 20: HLIN 6,13 AT 14
590  HLIN 37,38 AT 14: HLIN 31,33 AT 8: HLIN 8,38 AT 1
600  VLIN 1,8 AT 6: VLIN 1,8 AT 7
610  VLIN 8,19 AT 25: VLIN 1,14 AT 19: VLIN 8,19 AT 13
620  VLIN 9,19 AT 31: VLIN 21;31 AT 32: VLIN 26,38 AT 38
630  RETURN
640  REM  REMOVES DOT AND GIVES BONUS POINTS
650  IF  SCRN( X,Y) = C THEN 830
660  IF  SCRN( X,Y) = 9 THEN MO = MO + 2
670  IF  SCRN( X,Y) = 9 THEN  PRINT  CHR$ (7)
680  IF  SCRN( X,Y) = 9 THEN SC = SC + 1
690  PLOT X,Y
700  RETURN
710  REM  SUBROUTINE FOR SETTING RANDOM DOTS
720  FOR I = 1 TO 50
730 YY =  RND (40) * 40:XX =  RND (40) * 40
740  IF  SCRN( XX,YY) = (C) THEN  GOTO 730
750  IF  SCRN( XX,YY) = (9) THEN 730
760  COLOR= 9
770  PLOT XX,YY
780  NEXT I
790  GOTO 360
800 LO = 50 - SC
810  INVERSE : VTAB (22): PRINT " YOU RAN OUT OF MOVES !!!-";LO;" DOTS LEF
     T"
820  NORMAL : GOTO 840
830  VTAB (22): INVERSE : PRINT " YOU CRASHED !!!": NORMAL
840  FOR I = 1 TO 1000: NEXT I
850  VTAB (23): PRINT "PLAY AGAIN (Y/N)";: INPUT I$: PRINT "
     "
860  IF I$ = "Y" THEN  GOTO 320
870  IF I$ <  > "N" THEN 850
880  TEXT : HOME : END
890 SC = SC + MO: INVERSE
900  PRINT " YOU DID IT !!!       SCORE:";SC;" "
910  NORMAL : GOTO 840
```

VIC 20 Starship

Starship is a great variation on the old Space Invaders theme in which the enemy come at you horizontally along the space lanes. It has a number of interesting features, including excellent use of sound, and demonstrates what you can achieve with the VIC's block graphics and a little imagination.

There are also some clever programming ideas which you might like to study and incorporate in your own games.

First among these is the inclusion of a self-play mode: if no key is pressed after a while, your VIC runs the program of its own accord. Although the technique used is a simple one, it does give the program an extra touch of professionalism.

```
100 POKE650,128:POKE198,0:Y=30720:W=36879:SE=16:AM=7768:CC=25
111 POKEW,12:PRINT"■■■
```

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CONTROL DATA

```
610 POKEW-1,0:POKEW-2,0:PRINT"■■■■■■■  YOUR SCORE WAS "S1
620 PRINT"■■      ON PHASE "P
625 PRINT"■■DIFFICULTY LEVEL "O$
630 PRINT"■■■ENTER E TO EXIT.■■"
635 PRINT"■ANY KEY TO PLAY AGAIN":POKE198,0:PY=0
640 GETA$:PY=PY+1:IFPY=>2000THENA$="U"
641 IFA$=""THEN640
660 IFA$="E"THEN860
670 RUN
680 POKEW-5,0:IFRJ=8THENS1=S1+4
681 M=0:L=0:V=2::POKEJ+N,V:POKEJ+1+N,V:POKEJ+2+N,V:POKEJ+3+N,V
690 POKEW-2,220:FORL=15TO0STEP-.15:POKEW-1,L:NEXTL:SH=SH+1
    :POKEW-2,0:POKEW-1,0
730 FORC1=0TO3:POKEJ+C1,32:NEXTC1
740 IFCC=SHTHENS=S+1:CC=CC+25:P=P-1:AM=AM+2:SE=SE-2:GOSUB800
760 IFE=SETHENGOSUB820
770 GOSUB842:POKEW,PEEK(W)OR8:GOTO230
800 FORX=200TO255:POKEW-3,X:NEXT
820 POKEW-1,15:POKEW-2,220:FORL=15TO0STEP-.1:POKEW-1,L:NEXT:POKEW-2,0
    :POKEU,60:RETURN
842 PRINT"■■SHIPS■"S:PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■PHASE■"P"■■SCORE■"S1
    :GOSUB500:RETURN
860 PRINT"■■■■■■  BYE FOR NOW !!":END
900 R(1)=95:R(2)=98:R(3)=121:R(4)=70:RETURN
910 R(1)=32:R(2)=62:R(3)=232:R(4)=223:RETURN
```

Commodore Maths Test

by J Mace

J Mace has produced this arithmetic test program in Commodore Basic featuring five levels of difficulty with questions on addition, subtraction, division and multiplication.

```
1 PRINT"□"
2 GOSUB 800
4 PRINT"□"
5 PRINTSPC(14)"MATHS TEST"
6 PRINTSPC(14)"──────────"
10 LETJ=1
20 LETK=0
25 PRINT:PRINT:PRINT
30 PRINT"CHOOSE ARITHMETICAL OPERATION"  SPC(25) "(+,-,*,/)"
40 INPUTA$
45 PRINT:PRINT:PRINT
50 PRINT"SELECT YOUR SKILL LEVEL"          SPC(25) "(1,2,3,4,5)":INPUT A
51 PRINT"□"
90 IFA=1 THEN GOTO150
100 IFA=2 THEN GOTO180
110 IF A=3 THEN GOTO 250
120 IFA=4 THENGOTO320
130 IF A=5 THEN GOTO 360
135 IFA>5 GOTO50
140 END

150 LETX=INT(9*RND(1))+1
160 LETY=INT(9*RND(1))+1
170 GOTO390
180 IF A$="*" OR A$="/" THEN GOTO 220
190 LETX=INT(50*RND(1))+1
200 LETY=INT(50*RND(1))+1
```

```
210 GOTO390
220 LETX=INT(15*RND(1))+1
230 LETY=INT(15*RND(1))+1
240 GOTO390
250 IF A$="*"ORA$="/" THENGOTO 290
260 LETX=INT(99*RND(1))+1
270 LETY=INT(99*RND(1))+1
280 GOTO 390
290 LETX=INT(30*RND(1))+1
300 LETY=INT(30*RND(1))+1
310 GOTO390
320 IF A$="*"ORA$="/" THEN GOTO 190
330 LETX=INT(500*RND(1))+1
340 LETY=INT(500*RND(1))+1
350 GOTO390
360 IFA$="*"ORA$="/" THEN GOTO 260
370 LETX=INT(1000*RND(1))+1
380 LETY=INT(1000*RND(1))+1
390 IF A$="-" AND X<Y THEN GOTO 90
400 IF A$="/" THEN GOTO 640
410 IF J=11 THEN GOTO 710
420 LETJ=J+1
430 IFA$="+"THEN GOTO480

440 IF A$="-" THEN GOTO 580
450 IFA$ ="*" THEN GOTO 610
460 IF A$="/" THEN GOTO 670
480 LET Z=X+Y
490 PRINTX;"+";Y;"="
500 INPUT B
520 IFB=Z THEN GOTO 550
530 PRINT SPC(9)   "NO,ANSWER=";Z
540 GOTO 90
550 LETK=K+1
560 PRINT SPC(9)"YES, THAT WAS CORRECT"
570 GOTO 90
580 LET Z=X-Y
590 PRINTX;"-";Y;"="
600 GOTO 500
610 LETZ=X*Y
620 PRINTX;"*";Y;"="
630 GOTO500

640 LETZ=INT(X/Y)
650 IFNOT X=Z*Y THEN GOTO 90
660 GOTO 410
670 LETL=INT(11*RND(1))+1
680 LETX=(A*L)*X
685 LETZ=X/Y
690 PRINTX;"/";Y;"="

700 GOTO 500
710 PRINT:PRINT:   PRINTSPC(20) "SCORE=    ";K :PRINT:PRINT
711 IFK<5THENPRINTSPC(24)"▙** POOR **▫"
712 IFK<8ANDK>5THENPRINTSPC(24)"■** FAIR **▫"
713 IFK<10ANDK>7THENPRINTSPC(24)"▨** GOOD **▫"
714 IFK=10THENPRINTSPC(24)"▥** EXCELLENT **▫"
715 V=54296:W=54276:A=54277:H=54273:L=54272

716 FORX=15 TO 0STEP-1:POKEV,X:POKEW,129:POKEA,15:POKEH,
    40:POKEL,200:NEXT
```

```
717 POKEW,0:POKER,0
720 PRINT:PRINT" DO YOU WANT ANOTHER MATHS TEST ?
    PRESS ANY KEY TO START"
721 INPUTP$
725 GETP$:IFP$=""GOTO4
800 PRINT"■■■■■"
805 PRINT"THERE ARE 4 ARITHMETICAL OPERATIONS
    EACH WITH 5 LEVELS OF DIFFICULTY."
810 PRINT:PRINT"THIS PROGRAMME WILL RANDOMISE
    10 SUMS AT YOUR SELECTED LEVEL."
815 PRINT:PRINT"CAN YOU GET A MAXIMUM 10 SUMS CORRECT ?"
820 PRINT"■■■■■     REMEMBER- PRESS  ■RETURN■  AFTER EACH ANSWER"
825 FORX=1TO10000:NEXTX
830 RETURN
```

CHIP CHAT

Judge for yourself

Regular readers of *APC* will be aware of a great deal of excitement surrounding the announcement in the US of a computer system and games machine from Coleco. The computer system is pictured in last month's printout and apart from the brief description of the system under the picture we'll leave it there for the moment to reprint an interesting series of statements we have received from Futuretronics, the Australian distributors of the world's top selling Atari games machine, and CBS Electronics, the Australian distributors of Coleco's games machine and computer system.

The adjacent picture of the ColecoVision is printed and the Atari games machine is not because surely *APC* readers know what the latter looks like whereas the former is a newcomer.

The following statements are taken verbatim from press releases entitled "Atari's future not threatened by Coleco" (Futuretronics) and "CBS launches new TV games system in Australia" (CBS Electronics).

Futuretronics: "Futuretronics Australia Pty Ltd, exclusive distributors of the Atari range of video games and home computers, have hit back at media claims that its position as leader in the video games market is under attack from Coleco.

The company claims that recent press reports claiming that Coleco plans to take 40% of the video games market in Australia by Christmas, is a totally absurd statement."

CBS Electronics: "CBS Electronics (Australia) is budgeting to grab a similar slice of the market — 20 percent — in its first year of operations in Sydney, Melbourne, Brisbane, Adelaide and Perth."

CBS Electronics: "Coleco only introduced its system in the US a little over a year ago. Despite the fact that the price structure of the Coleco system was initially somewhat higher than the market leader, it found immediate public acceptance. So much so that in the first year it won 20 percent of the U.S. market."

Futuretronics: "He said (Peter Alpar MD of Futuretronics Australia Pty Ltd), 'It is absurd to suggest that our position is threatened by a competitor of the calibre of Coleco.'

A recent Silicon Valley newspaper report (San Jose Mercury, 11/8/83) regarding Coleco cites, 'Coleco stock is being dumped, a lot of the company's cartridge inventory is of questionable value and a big hit financially could wipe the company out altogether.' "

Futuretronics: "Hitting out at Coleco, Futuretronics cited a recent Wall Street Journal story (11/8/83) which suggests that 'Coleco is choking on mountains of Colecovision machines it is unable to sell.'

Coleco shares have tumbled and the Wall Street Journal questions whether Coleco can actually deliver to the marketplace its home computer as soon as it plans to."

CBS Electronics: "Last year Coleco was New York Stock Exchange's best performer, its shares soaring from $US6.80 to $US36.75. The company's sales have jumped 46 percent on the 1982 figure for the second quarter, to $US126.3 million."

Be sure that any more spicy bits we receive will be published!

. . . Regular readers of this august page will no doubt remember the reference, a couple of issues ago, to HELP, a fitness program which used those appalling instruments, skinfold calipers (shock, horror, probe, etc), as a sort of perverse peripheral device. Those who have a deep and heartfelt respect for that most admirable of qualities, decency, will no doubt prefer the 'tone up at the terminals' guide, produced by Verbatim Corporation in California, to help flabby operators improve their chances of competing in the Olympic Games next year. Naturally, this guide is in response to yet another report on eyestrain, backstrain . . . which are associated with VDUs. Members of the *APC* team who discussed this contemporary hobbyhorse reckon the manual typewriter to be a far worse cause of all sorts of strain than a mere VDU . . . What was very odd about the communique which related to this fitness guide is this: it included a photo of a suitably attractive young lady looking generally fit and ready to go — in some appropriate exercising pose. According to the caption enclosed with the photo she goes by the name of Denis Katnich, and she is a Los Angeles physiologist — Chip Chat reckons she is actually Denise and is a physiologist — we hope.

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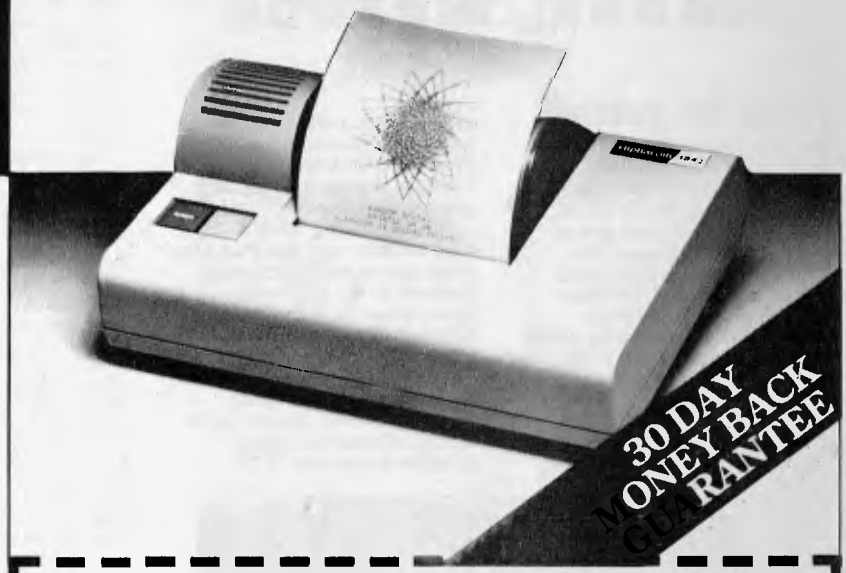

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